Revision–2021 :Mathematics X

SJ Notes on Focus Area

February 3, 2021

Focus point 1

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ The concept arithmetic sequence

1) Write an arithmetic sequence having first term 5 and common difference 3.

2) Look at the sequence of equilateral triangles. The sequence is formed by using matchsticks.

   a) Write the number of matchsticks in each term as a number sequence.
   b) Is this an arithmetic sequence.
   c) If so, what is its common diffrence?

3) a) Write the sequence of numbers ends with 1 or 6 in one's place.
   b) Is this an arithmetic sequence?
   c) If so, what is its largest two digit term?

4) a) Write the sequence of numbers which gives the remainder 2 on dividing by 3.
   b) What is the smallest three digit term of this sequence?

5) a) Write the sequence of numbers 3 more than the multiples of 5.
   b) Is this an arithmetic sequence?What is its common difference?
   c) What is the largest three digit term of this sequence?

6) a) Write the sequence of numbers having 1 in ones place.
   b) Describe this sequence in other words also.
   c) Is this an arithmetic sequence?

7) $\frac{1}{7}, \frac{2}{7}, \frac{3}{7} \cdots$ is a sequence.

a) The numerators are natural numbers in the order and denominator is 7. Is this an arithmetic sequence?

b) What is the position of 1 in this sequence?

c) What is the position of 100 in this sequence?

d) Is this sequence contain all natural numbers?

8) The sequence $7, 10, \bigcirc, 16, \bigcirc, 22$ is an arithmetic sequence.

a) What is the common difference of the sequence ?

b) What are the missing terms in the sequence ?

9) x, y, z are in arithmetic sequence.If $x - y = k(z - x)$ then what is k?

Answers

1) $5, 8, 11, 14 \cdots$

2) a) $3, 5, 7 \cdots$

b) $5 - 3 = 7 - 5 = 9 - 7$. Since common difference exists it is an arithmetic sequence.

c) Common difference is 2

3) a) $1, 6, 11, 16, 21, 26 \cdots$

b) Yes.

c) 96

4) a) $2, 5, 8, 11 \cdots$

b) 101

5) a) $8, 13, 18, 23 \cdots$

b) This is an arithmetic sequence. Common difference $d = 5$

c) 998

6) a) $1, 11, 21, 31 \cdots$

b) This is a squence of numbers 9 less than the multiples of 10.
or
The sequence of numbers which give the remainder 1 on dividing by 10
or
The sequence of numbers 9 less than the multiples of 10.

c) This is an arithmetic sequence.

7) a) $\frac{2}{7} - \frac{1}{7} = \frac{1}{7}$,
$\frac{3}{7} - \frac{2}{7} = \frac{1}{7}$
This is an arithmetic sequence with first term $\frac{1}{7}$ and common difference $\frac{1}{7}$

b) Seventh term $x_7 = \frac{7}{7} = 1$. 7 th term is 1, the first natural number.

c) $x_{700} = \frac{700}{7} = 100$.
700 th term is 100

d) When the numerators are $7, 14, 21, 28 \cdots$ we get all the natural numbers $1, 2, 3 \cdots$.

8) a) $7, 10, \bigcirc, 16, \bigcirc, 22$ is the given arithmetic sequence
$d = 10 - 7 = 3$

b) $7, 10, \boxed{13}, 16, \boxed{19}, 22$

9) Let d be the common difference .
$y - x = d, z - x = -2d$. Therefors $d = k \times -2d, k = \frac{-1}{2}$

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 5, 2021

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(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Term and position in an arithmetic sequence

1) Fourth term of an arithmetic sequence is 12, common difference 5.
   a) What is the third term?
   b) What is the first term ?
   c) Find the tenth term.

2) Tenth term of an arithmetic sequence is 74, common difference 4.
   a) What should be added to its 10 th term to get 15 th term?What is the 15 th term?
   b) Find the fifth term of this sequence .
   c) Find the first term .
   d) Write the sequence .
   e) What is the remainder when the terms are divided by its common difference.

3) a) What is the common difference of the arithmetic sequence $1, 7, 13, 19 \cdots$
   b) What is the remainder when the terms are divided by its common difference?
   c) Is 100 a term of this sequence ?
   d) Which is the first two digit term of this sequence ?
   e) What is the first three digit term of this sequence ?

4) The difference between third term and seventh term of an arithmetic sequence is 20.
   a) What is the common difference of this sequence?
   b) What is the difference between 10 th term and 18 th term.
   c) What should be added to the 18 th term to get 24 th term.

5) First term of an arithmetic sequence is 4 and tenth term 40.
   a) What is the common difference of the sequence .
   b) What is the fifth term of the sequence ?
   c) What should be added to the fifth term to get fifteenth term?
   d) What is the difference between second term and eighth term?

6) The difference between 4 th term and 7th term os 12
   a) What is the difference between seventh term and thirteenth term .
   b) What should be added to the 10 th term to get 20 th term?
   c) Can the difference between any two terms of this sequenec 36. How can you realize this ?

7) a) Write the sequence of numbers obtained by adding 4 to the multiples of 3.

b) Is 43 a term of this sequence ?

c) Can the difference between any two terms of this sequence 81

d) What should be added to the 10 th term to get 21 st term.

8) Seventh term of an arithmetic sequence is 16 and nineth term is 24

a) What is the common difference ?

b) What is the 20 th term of the sequence ?

c) What is the first term of the sequence?

d) Can the sum of some terms of this sequence 110? How can you realize this ?

SJ Focus Series

Answers

1. a) $x_3 = x_4 - d = 12 - 5 = 7$

b) $x_1 = x_4 - 3d = 12 - 3 \times 5 = 12 - 15 = -3$

c) $x_{10} = x_4 + 6d = 12 + 6 \times 5 = 12 + 30 = 42$

2. a) 5 times common difference should be added .
$x_{15} = x_{10} + 5d = 74 + 5 \times 4 = 74 + 20 = 94$

b) $x_5 = x_{10} - 5d = 74 - 5 \times 4 = 74 - 20 = 54$

c) $x_1 = x_{10} - 9d = 74 - 9 \times 4 = 74 - 36 = 38$

d) $38, 42, 46 \cdots$

e) When the terms are divided by 4 the remainder will be 2 .

3. a) $d = 7 - 1 = 6$

b) When the terms are divided by 6 the remainder will be 1

c) When 100 is divided by 6 the remainder is found to be 4. We know that the reaminder the ramainder obtained by dividing the terms by the common diffrence 6 is 1. So 100 is not a term of the sequence

d) 13

e) 103

4. a) $x_7 - x_3 = 4d$
$4d = 20, d = 5$

b) $x_{18} - x_{10} = 8d = 8 \times 5 = 40$

c) When 6 times common difference is added we get 24th term
Number to be added is $6d = 6 \times 5 = 30$

5. a) $9d = 40 - 4 = 36$, $d = 4$

b) When 10 times common difference is added to the fifth term we get 15 th term . The number to be added is $= 10 \times 4 = 40$

c) $x_8 - x_2 = 6d = 6 \times 4 = 24$

6. a) $x_7 - x_4 = 3d = 24$
$x_{13} - x_7 = 6d = 2 \times 3d = 2 \times 24 = 48$

b) $3d = 24, d = 8$
$x_{20} = x_{10} + 10d$. Number to be added is $= 10 \times 8 = 80$

c) The difference between any two terms of the sequence is a multiple of common difference.36 is not a multiple of 8.
36 cannot be the difference between two terms.

7. a) $7, 10, 13 \cdots$

b) Common difference is 3.When the terms are divided by 3 the remainder is 1.
On dividing 43 by 3 the remainder is 1.That is 43 is a term .

c) The difference between two terms of the arithmetic sequence is a multiple of the common difference.Since 81 is a multiple of 3 , the common difference we can say 81 can be the difference between two terms

d) When 11 times common difference is added to the tenth term get 21 st term .
Number to be added is $11 \times 3 = 33$

8. a) $2d = 24 - 16 = 8, d = 4$

b) $x_{20} = x_9 + 11d = 24 + 11 \times 4 = 24 + 44 = 68$

c) $x_1 = x_7 - 6d = 16 - 6 \times 4 = 16 - 24 = -8$

d) All terms are multiples of 4. So sum of the terms will be a multiple of 4.
110 is not a multiple of 4.So we can say 110 cannot be the sum of some terms of the sequence.

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Revision–2021 :Mathematics X

SJ Notes on Focus Area

February 6, 2021

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(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

Algebra of arithmetic sequence

1) Observe the arithmetic sequence given below.

$$3, 5, 7, 9 \cdots$$

A pattern can be seen below
$3 = 2 \times 1 + 1$
$5 = 2 \times 2 + 1$
$7 = 2 \times 3 + 1$

a) Write the term 9 as shown in the pattern.
b) Which is the smallest two digit term of this sequence?
c) Find the 20 th term of this sequence
d) Write the algebraic form or n th term of this sequence.

2) $5, 8, 11 \cdots$ is an arithmetic sequence

a) Write the algebraic form of this sequence
b) Using the algebraic form find its 10 th term.
c) Find the 25 th term of this sequence .
d) Is 152 a term of this sequence?

3) There is a shortcut fo write the algebraic form of an arithmetic sequence.
If f stands for the first term, d for common difference then the n th term is $x_n = dn + (f - d)$.
Consider the sequence $7, 10, 13, 16, 19 \cdots$

a) Write the algebraic form of the sequence.
b) What is the 10 th term of the sequence?
c) Which is the largest two digit term of this sequence?

4) Algebraic form of an arithmetic sequence is $3n + 4$

a) What is the common difference and first term of this sequence
b) Can the difference between any two terms of this sequence 144?
c) Is 144 a term of this sequence?
d) If 144 is not a term then write the term of the sequence just above 144?

5) First term of an arithmetic sequence is $\frac{1}{2}$ and common difference is $\frac{1}{6}$.

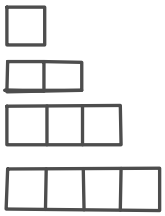
a) Write the algebraic form of this sequence?

b) At what position a natural number appear first time in the sequence?

c) Is this sequence contains all natural numbers as terms?What are the positions of natural numbers.

d) At what position 5 appear in this sequence?

6) The picture shown below is a pattern of squares made by using matchsticks .



a) Write the number of matchsticks in each line as a sequence.

b) Write the algebraic form of this sequence?

c) How many matchsticks are nedded to make 20th line of this pattern.

d) Is any line contains 100 matchsticks ? If so, what is the position of this line?

7) Consider the arithmetic sequence $125, 120, 115 \cdots$

a) What is the common difference of this sequence?

b) Write the algebraic form of this sequence

c) How many positive terms are there in this sequence?

d) At what position the first negative term appears in this sequence?

8) In the arithmetic sequence $10, 17, 24 \cdots 178$

a) What is the common difference of this sequence ?

b) Write the algebraic form of this sequence?

c) How many terms are there in this sequence?

d) Which number comes as the middle term of this sequence?

SJ Focus Series

Answers

1. a) $9 = 2 \times 4 + 1$

   b) Smallest two digit term $= 2 \times 5 + 1 = 11$

   c) $x_{20} = 2 \times 20 + 1 = 41$

   d) $x_n = 2n + 1$

2. a) $5 = 3 \times 1 + 2, 8 = 3 \times 2 + 2, 11 = 3 \times 3 + 2$
   $x_n = 3n + 2$

   b) $x_{10} = 3 \times 10 + 2 = 32$

   c) $x_{25} = 3 \times 25 + 2 = 77$

   d) $152 = 3 \times 50 + 2$
   152 is the 50th term

Another method

$3n + 2 = 152 \to 3n = 152 - 2 = 150, n = \frac{150}{3} = 50$

3. a) $d = 10 - 7 = 3$
   $x_n = dn + (f - d) = 3n + (7 - 3) = 3n + 4$
   b) $x_{10} = 3 \times 10 + 4 = 34$
   c) $3n + 4 < 100 \to 3n < 96, n < 32$. That is $n = 31$
   d) 31 st term is $3 \times 31 + 4 = 97$. This is the largest two digit term.

4. a) $d = 3, f = 3 \times 1 + 4 = 7$
   b) The difference between two terms of an arithmetic sequence will be a multiple of common difference.144 is a multiple of common difference .That is 144 can be the difference between two terms of this arithmetic sequence.
   c) When the terms are divided by the common difference we get the same remainder, provided the terms are natural numbers. Here on dividing first term 7 by the common difference 3 we get the remainder 1. When 144 is divided by 3 the remainder is found to be 0.
   That is 144 is not a term of the sequence.
   d) The first number above 144 gives the remainder 1 on dividing by 3 is 145. That is 145 is the required term.

5. a) $f = \frac{1}{2}, d = \frac{1}{6}$
   $x_n = dn + (f - d) = \frac{1}{6} + (\frac{1}{2} - \frac{1}{6} = \frac{1}{6}n + (\frac{3}{6} - \frac{1}{6}$
   $x_n = \frac{1}{6} + \frac{3}{6} = \frac{n+2}{6}$
   b) $n = 4$ആയാൽ $\frac{4+2}{6} = \frac{6}{6} = 1$
   The natural number 1 appears as the 4 th term of the sequence.
   c) Yes. when $n = 4, 10, 16, 22, \cdots$, $x_4 = \frac{4+2}{6} = 1, x_10 = \frac{10+2}{6} = \frac{12}{6} = 2$, $x_{16} = \frac{16+2}{6} = 3$ and so on.
   All natural numbers appear as the 4 th , 10th , 16 th $\cdots$ positions in the sequence .
   d) 28 th term is 5

6. a) $4, 7, 10 \cdots$
   b) This is an arithmetic sequence . $x_n = dn + (f - d) = 3n + (4 - 3) = 3n + 1$
   c) 20th term is $3 \times 20 + 1 = 61$.
   d) $3n + 1 = 100 \to 3n = 99, n = 33$
   100 is 33rd term of this sequence .

7. a) $d = 120 - 125 = -5$
   b) $x_n = dn + (f - d) = -5n + (125 -^{-} 5) = -5n + 130$
   c) $-5n + 130 > 0, 130 > 5n$. $5n < 130, n < \frac{130}{5} = 26$
   $n < 26 \to n = 25$. There are 25 terms in this sequence.

8. a) $d = 17 - 10 = 7$
   b) $x_n = dn + (f - d) = 7n + (10 - 7) = 7n + 3$
   c) $7n + 3 = 178 \to 7n = 175, n = \frac{175}{7} = 25$.There are 25 terms in this sequence.
   d) 13 th term is the middle term . $x_{13} = 7 \times 13 + 3 = 94$

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 6, 2021

4

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Sum of counting numbers

1) As we discussed earlier the summation of counting numbers from the beginning in an order is performed by pairing the numbers from both ends.
It is illustrated below
$1, 2, 3, 4, 5, 6, 7, 8, 9, 10$ can be paired as $(1, 10), (2, 9), (3, 8), (4, 7), (5, 6)$
Pair sum is 11. The sum of numbers is $11 \times 5 = (1 + 10) \times \frac{10}{2}$
So the sum of first n counting numbers is $\frac{n(n+1)}{2}$

   a) What is the sum of first 10 counting numbers?
   b) Calculate the sum $1 + 2 + 3 + 4 + \cdots 100$
   c) Find the sum of first 25 natural numbers.

2) Look at the pattern given below
$1 = 1$
$1 + 3 = 4 = 2^2$
$1 + 3 + 5 = 9 = 3^2$
$1 + 3 + 5 + 7 = 16 = 4^2$
The sum of first n odd numbers is n^2.

   a) What is the sum of first 10 odd numbers?
   b) How many odd numbers from 1 in an orded makes the sum 400?
   c) How many odd numbers are there below 100? What is its sum?
   d) Sum of the odd numbers from 1 in an order makes the sum in between 900 and 1000. How many odd numbers make this sum? Which number is largest among them.

3) Consider the sequence of even numbers $2, 4, 6, 8, 10 \cdots$
Look at the pattern formed from this sequence
$2 + 4 = 6 = 2 \times 3 = 2(2 + 1)$
$2 + 4 + 6 = 12 = 3 \times 4 = 3(3 + 1)$
$2 + 4 + 6 + 8 = 20 = 4 \times 5 = 4(4 + 1)$
$- - - - - - - - - - - - - - - - - -$

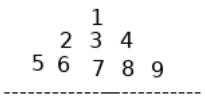
   a) What is the sum of first 5 even numbers?
   b) Find the sum $2 + 4 + 6 + 8 + 10 + \cdots 50$
   c) What is the sum of first 20 even numbers? Using this find the sum of first 20 counting numbers.

4) The sum of first n even numbers is $n(n + 1)$.using this formula calculate the following

   a) What is the sum of first 10 even numbers?
   b) What is the sum of all even numbers below 100?

c) How much the sum of first 50 even numbers is greater than the sum of first 50 odd numbers.

5) Look at the pattern given below



a) Write the sequence of numbers at the right end of each line in the pattern.

b) Which number comes in the right end of 20 th line?

c) In which line the number 850 appears?

d) How many natural numbers are needed to make 50 lines?

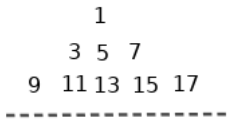
e) Find the sum of all counting numbers to make 50 lines in the pattern.

6) a) What is the sum of first 9 counting numbers?

b) Calculate the sum of first 20 counting numbers.

c) What is the sum of counting numbers from 10 to 20

7) Look at the pattern given below



a) Write the number of numbers in each line as a sequence.

b) How many numbers are there in 20 th line?

c) Which number comes at the right end of 20 th line?

d) What is the sum of all numbers needed to make 20 lines?

SJ Focus Series

Answers

1) a) Sum of the first 10 counting numbers $= \frac{10\times(10+1)}{2} = 5 \times 11 = 55$

b) $1 + 2 + 3 + 4 + \cdots + 100 = \frac{100\times(100+1)}{2} = 50 \times 101 = 5050$

c) Sum of the first 25 counting numbers$= \frac{25\times(25+1)}{2} = 25 \times 13 = 325$

2) a) $10^2 = 100$

b) $n^2 = 400 \rightarrow n = \sqrt{400} = 20$
Sum of the first 20 odd numbers is 400

c) There are 50 odd numbers below 100.Sum of these numbers $= 50^2 = 2500$

d) Sum of the first n odd numbers is n^2 .There is only one perfect square in between 900 and 1000.It is 961.
$n^2 = 961, n = 31$ there are 31 odd numbers. The largest is the 31 st odd number. 31st odd number is 61

3) a) Sum of the first 5 odd numbers is $5 \times (5 + 1) = 5 \times 6 = 30$

b) $2+4+6\cdots+50=2(1+2+3\cdots+25)=2\times\frac{25(25+1)}{2}=25\times26=650$
Another method
There are 25 odd numbers below 50 . Sum $=25(25+1)=25\times26=650$

4) a) $10\times(10+1)=10\times11=110$

b) There are 50 even numbers below 100. Sum of these numbers is $50(50+1)=50\times51=2550$

c) $2550-2500=50$

5) a) $1,4,9,16\cdots$

b) $20^2=400$

c) Number at the right end of 29 th line is $=29^2=841$
Number at the right end of 30 th line is $=30^2=2500$
850 comes in 30 th line.

d) Number at the right end of 50th line is $50^2=2500$.
2500 counting numbers are needed to write 50 lines

e) Sum $\frac{2500(2500+1)}{2}=1250\times2501=3126250$

6) a) Sum of first 9counting numbers $=\frac{9\times(9+1)}{2}=45$

b) Sum mof first 20 counting numbers $=\frac{20\times(2+1)}{2}=210$

c) Sum of all counting numbers from 10 to 20 is $=210-45=165$

7) a) $1,3,5,7\cdots$

b) This is an arithmetic sequence . $x_n=2n-1$
$x_{20}=2\times20-1=799$
There are 799 numbers in 20 th line.

c) Sequence of numbers in the right end of each line
$1,7,17,31\cdots$
Algebraic form is $=2n^2-1$. Number at the right end of 20 th line is $2\times20^2-1=799$

d) Number of odd numbers from 1 to 799 is
$2n-1=799, 2n=800, n=400$.
Sum $=400^2=160000$

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 7, 2021

5

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Sum of the terms of an arithmetic sequence (Excluding the algebraic form of the sum)

1) There is an important property to an arithmetic sequence
If the sequence contains even number of terms we can make the terms pairs taking equidistant from both ends .Sum of the terms in each pair are equal.
That means sum of the terms equidistant from both ends are equal.
Consider the arithmetic sequence $7, 10, 13, 16, 19, 22, 25, 28, 31, 34$.
   a) Make pairs taking the terms equidistant from both ends of the sequence. What is the sum of the terms in each pair?
   b) Calculate the sum of the terms of this sequence.
   c) If x_1 stands for the first term and x_n the last term then establish a formula to calculate the sum of the terms.
   d) If the sequence is $7, 10, 13, 16, 19, 22, 25, 28, 31$ can you apply this formula to calculate the sum of the terms. verify!

2) Algebraic form of an arithmetic sequence is $3n + 5$
   a) What is the first term of this sequence?
   b) Find the 25 th term of this sequence?
   c) Calcualte the sum of the first 25 terms of this sequence.
   d) Which term comes in the middle of this sequence ?

3) 21 st term of an arithmetic sequence is 100.
   a) What is the sum of the 20th term and 22 nd term?
   b) what is the sum of first term and 41 st term.
   c) Calculate the sum of first 41 terms of this sequence?

4) The angles of a pentagon are in an arithmetic sequence.
   a) Which angle measure is constant ?
   b) If the smallest angle is 40° then what is the measure of the largest angle?
   c) What is the difference between two adjacent angles if the smallest angle is 40°
   d) Can the smallest angle is 36°. Explain

5) The sum of the first 39 terms of an arithmetic sequence is 2379.
   a) What is the 20 th term of this sequence?
   b) What is the sum of first and 39 th term of this sequence?

c) If the first term is 4 what is its 39 th term?

d) What is the sum of 15 th term and 25 th term?

6) The sum of first 9 terms of an arithmetic sequence is 45.The sum of the first 18 terms is 171

a) What is the sum of its 10 th to 18 th terms?

b) What is its 5 th term ?

c) What is its 14 th term?

d) Find the sum of 5 th to 14 th terms?

7) The picture shown below is a sequence of equilateral triangles made by matchsticks.

a) Write the sequence of the number of matchsticks to make the terms .

b) Write the algebraic form of this sequence

c) How many matchsticks are needed to make 20 th term?

d) Calculate the total number of matchsticks to make 20 terms of this sequence?

SJ Focus Series

Answers

1) a) $(7, 34), (10, 31), (13, 28), (16, 25), (19, 22)$
Sum of the numbers in the pair is 41

b) There are 5 pairs . Sum of the numbers in the pair $= 41$
Sum of the numbers in the sequence $= 41 \times 5 = 205$

c) Sum of the numbers in the sequence $=$ pair sum $\times$ number of terms
Sum $= (x_1 + x_n) \times \frac{n}{2}$

2) a) $x_1 = 3 \times 1 + 5 = 8$

b) $x_{25} = 3 \times 25 + 5 = 80$

c) Sum of 25terms $= (x_1 + x_{25}) \times \frac{25}{2} = (8 + 88) \times \frac{25}{2} = \frac{88 \times 25}{2} = 44 \times 25 = 1100$

3) a) $x_{20} + x_{22} = 2 \times 100 = 200$

b) $x_1 + x_{41} = x_{20} + x_{22} = 200$

c) $(x_1 + x_{41}) \times \frac{41}{2} = 200 \times \frac{41}{2} = 4100$

4) Sum of the angles in the pentagon $= (5 - 2) \times 180 = 540°$

a) Third term is the middle term .
$x_3 = \frac{540}{5} = 108$
Middle term is always 108

b) $x_3 - x_1 = 2d \rightarrow 108 - 40 = 2d, 2d = 68, d = 34.$
Largest angle $= x_3 + 2d = 108 + 2 \times 34 = 108 + 68 = 176$

c) The diffrence between two adjacent angles $= 34°$

d) If the smallest angle is 36 then $2d = 108 - 36 = 72, d = 36.$
Largest angle $= x_3 + 2d = 108 + 72 = 180°$.The angle of a polygon cannot be $180°$.That is $36°$ is the smallest angle

5) When we consider 39terms 20th term will be the middle term.

a) $x_{20} = \frac{2379}{39} = 61$

b) $x_1 + x_{39} = 2 \times x_{20} = 2 \times 61 = 122$

c) $x_1 + x_{39} = 122 \to 4 + x_{39} = 122, x_{39} = 122 - 4 = 118$

d) $x_{15} + x_{25} = x_1 + x_{39} = 122$

6) a) Sum of the terms from 10 th to 20 th $=$sum of the first 18 terms $-$Sum of the first 9 terms.
തുക$= 171 - 45 = 126$

b) When we consider first 9 terms , fifth term will be the middle term.
$x_5 = \frac{45}{9} = 5$

c) $x_5 + x_{14} = \frac{171}{9} = 19$
$5 + x_{14} = 19, x_{14} = 14$

d) Sum $= (x_1 + x_{14}) \times \frac{10}{2} = 19 \times 5 = 95$

7) a) $3, 5, 7, 9 \cdots$

b) $x_n = dn + (f - d) = 2n + 1$

c) $x_{20} = 2 \times 20 + 1 = 41$

d) Sum of the first 20 terms $= (x_1 + x_{20}) \times \frac{20}{2} = (3 + 41) \times 10 = 44 \times 10 = 440$

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Revision–2021 :Mathematics X

SJ Notes on Focus Area

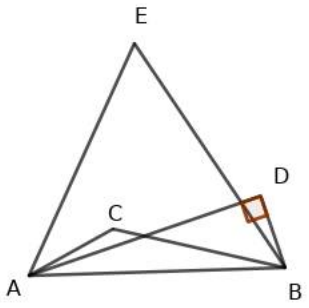
February 8, 2021

6

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Angle in the semicircle.

1) In the figure $\triangle ACB$, $\triangle ADB$ and $\triangle AEB$ have the same base AB. If $\angle ADB = 90°$ then



a) What is the position of D based on the circle with diametre AB?

b) What is the position of E based on the circle with diametre AB?

c) What is the position of C based on the circle with diametre AB?

2) Draw a circle of diametre 5cm. Construct a rectangle with diagonal 5cm and one of its sides 3cm
Write the principle of construction.

3) Sides of a triangle are $\sqrt{2}$cm , $\sqrt{3}$cm and $\sqrt{5}$cm.

a) What is the position of the vertex based on the circle with opposite side $\sqrt{5}$cm as the diametre?

b) What is the position of the vertex based on the circle with opposite side $\sqrt{2}$cm as the diametre?

c) What is the position of the vertex based on the circle with opposite side $\sqrt{3}$cm as the diametre?

4) a) Draw a square of diagonal 6cm such that the vertices are on a circle.

b) What is the length of its side ?

c) What is the area of the square?

5) Sides of triangle $ABC$are $AB = 5$cm, $AC = 12$cm ,$BC = 13$cm

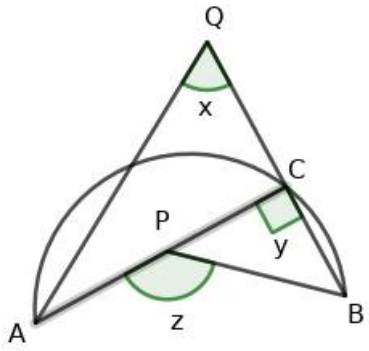
a) What kind of triangle is this ?

b) What is the position of A based on the circle with diametre BC?

c) What is the position of C based on the circle with diametre AB?

d) What is the position of B based on the circle with diametre AC?

6) In the figure AB is the diametre of a semicircle.Three angles x, y, z are marked outside, on the semicircle and inside the semicircle.

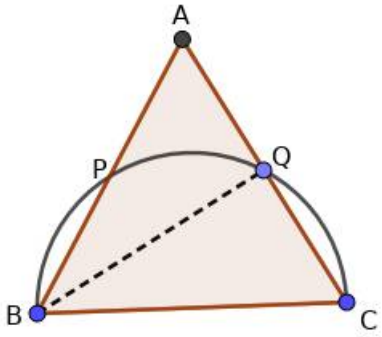


a) What is the value of y?

b) If x, y, z are in an arithmetic sequence,then what is $x + z$?

c) If the common difference of the sequence is 50 then find x and z

7) ABC is an equilateral triangle.A semicircle is drawn with diametre AB. Semicircle intersect the sides at P and Q.



a) What is the measure of angle BQC?(Draw angle in the figure)

b) What are the measures of $\angle CBQ$, $\angle BCQ$?

c) Prove that the semicircle bisects the side AB and AC

SJ Focus Series

Answers

1) a) Since $\angle D = 90^\circ$,D is on the circle.
   b) Since $\angle E < 90^\circ$,E is outside the circle
   c) Since $\angle C > 90^\circ$, C is inside the circle.

2) ⋆ Draw a circle of diametre 5cm . Mark the diametre as AC.
   ⋆ Draw an arc of radius 3cm ,center at A which cut the circle at a point B on one side of the diametre.
   ⋆ Draw another arc with centre C and radius 3cm which cut the circle at D on the other side of the diametre
   ⋆ Complete the rectangle $ABCD$

⋆ Angle in the semicircle is 90°

3) Triangle satisfies the relation $\sqrt{2}^2 + \sqrt{3}^2 = \sqrt{5}^2$. Hypotenuse is $\sqrt{5}$ cm

a) Since the angle opposite to 90° is $\sqrt{5}$cm the vertex of 90° angle is on the circle.

b) The angle opposite to the side $\sqrt{3}$cm is less than 90°. So the vertex of this angle is outside the circle with this side as the diametre.

c) Angle opposite to the side of length $\sqrt{2}$cm is less than 90°. The vertex is outside the circle.

4) a) Draw a circle of diametre 6cm . Draw two perpendicular diametres.Complete the square by joining the ends of the diametre.

b) Since the radius is 3cm one side is $3\sqrt{2}$cm

c) Area $(3\sqrt{2})^2 = 18$ sq.cm

5) a) $12^2 + 5^2 = 13^2$
sides obey pythagorian relation.It is a right triangle.

b) BC is the hypotenuse .So $\angle A = 90^\circ$. A is on the circle.

c) $\angle C < 90^\circ$. C is outside the circle with diametre AB

d) $\angle B < 90^\circ$. B is outside the circle with AC as the diametre.

6) a) $y = 90^\circ$

b) x, y, z is an arithmetic sequence . $x + z = 2y \to x + z = 180^\circ$

c) $x = 90 - 50 = 40^\circ, z = 90 + 50 = 140^\circ$

7) a) $\angle BQC = 90^\circ$

b) Since ABC is an equilateral triangle $\angle C = 60^\circ$.
$\angle CBQ = 30^\circ, \angle BCQ = 60^\circ$

c) BQ is an altitude AC . Altitude bisect the side.Similarly CP bisect the side AB

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Revision–2021 :Mathematics X

SJ Notes on Focus Area

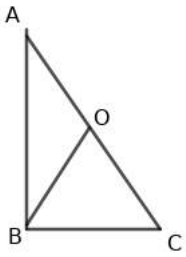
February 9, 2021

7

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Central angle of an arc and angle in the complementary arc.

1) $\triangle ABC$ is a right angled triangle with hypotenuse AC.The line OB joins the vertex B and mid point of the hypotenuse.

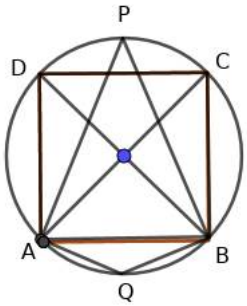


a) If $\angle BOC = 40^\circ$ then what is the measure of $\angle A$?

b) What is the measure of $\angle C$?

c) If the perpendicular sides are a and b then what is the length OB?

2) $ABCD$ is a square.The diagonals meet at O.

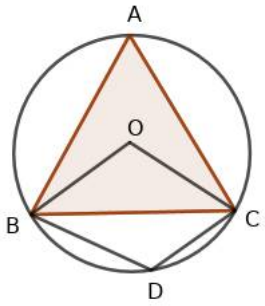


a) What is the measure of $\angle AOB$?

b) What is the measure of $\angle APB$?

c) What is the measure of $\angle AQB$?

3) Triangle ABC is an equilateral triangle.



a) What is the measure of $\angle BAC$?

b) What is the measure of $\angle BOC$?

c) What is the measure of $\angle BDC$?

d) If $BD = CD$ then suggest a suitable name to $OBDC$

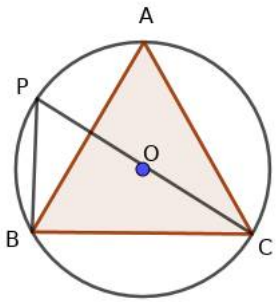
4) Two angles of a triangle are $70°, 30°$. The vertices are on a circle of radius 3 cm

a) Draw the triangle.

b) Mention the geometric principle of this construction.

5) Draw a circle of radius 3cm and mark an arc of central angle $60°$.Draw a quadrilateral with the vertices are on this circle. Two opposite angles should be $30°$ and $150°$.

6) In the figure triangle ABC is an equilateral triangle and triangle PBC is a right triangle.



a) What are the angles of the right triangle?

b) If $PB = 10$cm what is the radius of the circle?

7) Draw a circle of radius 3cm and draw the angles $45°$ and $135°$ on this circle.

SJ Focus Series

Answers

1) Mid point of the hypotenuse is the center of the circumcircle. Consider the circle passing through the vertices

a) $\angle BOC = 40° \rightarrow \angle BAC = 20°$

b) $\angle C = 180 - (90 + 20) = 180 - 110 = 70°$

c) $AC = \sqrt{a^2 + b^2}$.
$OA = OB = OC = \frac{\sqrt{a^2+b^2}}{2}$

2) Diagonals of the square intersect at O.(Mark the centre O at the centre)

   a) $\angle AOB = 90^\circ$

   b) $\angle APB = \frac{90}{2} = 45^\circ$ (Angle formed by the arc at the centre is two times angle in the complement)

   c) $\angle AQB = 180 - 45 = 135^\circ$(Sum of the angles in the arc and at the complement is 180°

3) a) $\angle BAC = 60^\circ$

   b) $\angle BOC = 2 \times 60^\circ = 120^\circ$

   c) $\angle BDC = 180 - 60 = 120^\circ$

   d) $OBDC$ This is a rhombus

4) a) Draw a circle of radius 3cm.Divide angle around the centre as $2\times 70 = 140^\circ, 2\times 30 = 60^\circ$ by drawing two radii.The remaing part of the angle will be 160°.Complete the triangle by joining the ends of the radii

   b) Angle formed by the arc at the centre is two times angle in the complement.

5) a) Draw a circle of radius 3cm .Mark a point A on the circle.
   With A as the centre and radius 3cm which cut the circle at B. If O is the centre of the circle then $\angle AOB = 60^\circ$.
   The central angle of arc AB is 60°.Mark P in the complemen. $\angle APB = 30^\circ$. Mark Q in AB. $\angle AQB = 180 - 30 = 150^\circ$.

   b) Angle formed by the arc at the centre is two times angle in the complement.Sum of the angles in the arc and at the complement is 180°

6) a) Since $\angle BAC = 60^\circ$, $\angle BPC = 60^\circ$
   (Angle in the same arc)
   $\angle B = 90^\circ, \angle C = 30^\circ$

   b) Triangle BPC ഒരു $30^\circ - 60^\circ - 90^\circ$ right triangle .
   Side opposite to 30° is 10cm . Side opposite to 90° is 20cm
   Radius $= 10$cm

7) a) Draw the circle . Draw perpendicular diametres AB and CD. Diametres intersect at O .
   O is the centre of the circle .
   $\angle BOC = 90^\circ$. Mark P in the complemet of BC , draw $\angle BPC$. $\angle BPC = 45^\circ$

   b) Q in the arc BC .Draw angle BQC. $\angle BQC = 180 - 45 = 135^\circ$

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Revision–2021 :Mathematics X

SJ Notes on Focus Area

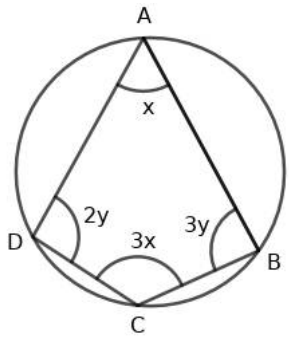
February 10, 2021

8

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Cyclic Quadrilaterals.

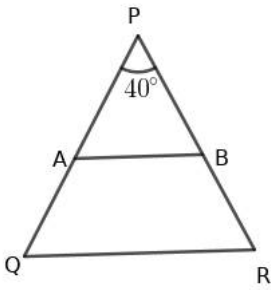
1) The vertices of the quadrilateral $ABCD$ are on a circle.$\angle A = x, \angle B = 2y, \angle C = 2x$ and $\angle D = 3y$



a) Find x and y

b) Write the angles of the quadrilateral

2) In the triangle PQR the sides PQ and PR are equal. A is the mid point of PQ and B is the mid point of PR. Also , $\angle P = 40°$

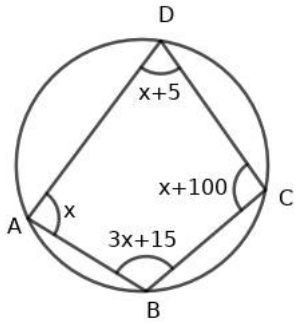


a) What is the measure of $\angle Q$ and $\angle R$?

b) Find the angles of $QABR$

c) Is this a cyclic quadrilateral?

3) The vertices of $ABCD$ are on a circle.$\angle A = x, \angle B = 3x + 15, \angle C = x + 100$ and $\angle D = x + 5$

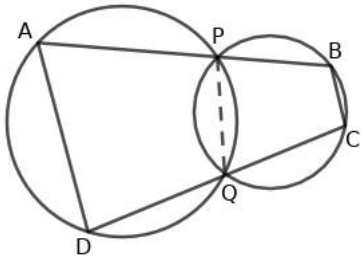


a) Find x

b) What are the angles of $ABCD$

c) Is this a cyclic quadrilateral?

4) In the figure two circles intersect at P and Q.
$PBCD$ is a quadrilateral in which $AB = CD$



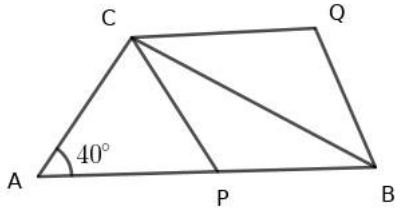
a) If $\angle A = x$ then what is $\angle PQD$?

b) What is $\angle ABC$?

c) Is AD parallel to BC? How can you realize?

d) Prove that $ABCD$ is a cyclic quadrilateral .

5) In the triangle ABC, P is a point on AB such that $CA = CP$.
The line through B parallel to PC and the line through C parallel to AB intersect at Q.
$\angle A = 40°$



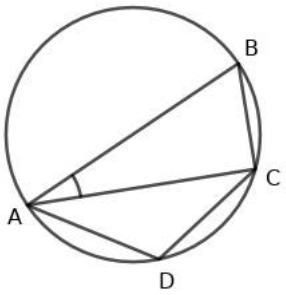
a) What is the measure of $\angle APC$?

b) What is the measure of $\angle BQC$?

c) Is $ABQC$ a cyclic quadrilateral?

d) Suggest a suitable name to $ABQC$

6) The vertices of $ABCD$ are on a circle with diametre AB.
$\angle BAC = 20°, AD = CD$

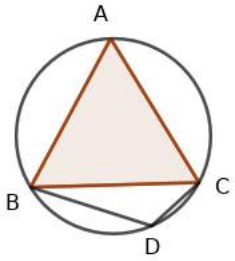


a) What is the measure of angle B?

b) What is the measure of $\angle D$?

c) Find other two angles of $ABCD$?

7) In the figure $\triangle ABC$ is an equilateral triangle.The measure of $\angle BCD$ is two times the measure of $\angle CBD$.



a) What is the measure of $\angle BDC$

b) Find $\angle CBD$ and $\angle BCD$

c) What is the measure of $\angle ABD$ and $\angle ACD$

SJ Focus Series

Answers

1) a) Since $ABCD$ is cyclic opposite angle sum is $180°$
$x + 3x = 180 \rightarrow 4x = 180, x = 45$
$2y + 3y = 180, 5y = 180, y = 36°$

b) $\angle A = 45°, \angle B = 3 \times 36 = 108°, \angle C = 3 \times 45 = 135°, \angle D = 2 \times 36 = 72°$

2) a) Since $PQ = PR$ then $\angle Q = \angle R$
$\angle Q + \angle R = 180 - 40 = 140$
$\angle Q = 70°, \angle R = 70°$

b) Line AB is parallel to QR , $ABRQ$ is a trapezium .
$\angle Q + \angle A = 180, \angle A = 180 - 70 = 110°$
Similarly $\angle B = 110°$

c) $\angle Q + \angle B = 70 + 110 = 180°$.$\angle A + \angle R = 70 + 110 = 180°$.This is a cyclic quadrilateral .

3) a) Angle sum of a quadrilateral is $360°$.
$x + 3x + 15 + x + 100 + x + 5 = 360 \rightarrow 6x + 120 = 360, 6x = 240, x = 40$

b) $\angle A = 40°, \angle B = 3 \times 40 + 15 = 135°, \angle C = 40 + 100 = 140°, \angle D = 40 + 5 = 45°$

c) $\angle A + \angle C = 40 + 140 = 180°$. Similarly $\angle B + \angle D = 180$
$ABCD$ is cyclic.

4) a) $ADQP$is cyclic .$\angle A = x, \angle Q = 180 - x$

b) $\angle PQC = 180 - (180 - x) = x$
$PQCB$is a clic quadrilateral $\angle B = 180 - x$

c) $\angle A + \angle B = x + 180 - x = 180°$. Cointerior angle sum is $180°$. $AD$is parallel to BC

d) $AB = CD$, AD is parallel to BC, $ABCD$ is an isosceles trapezium
$\angle A = \angle D = x$
$\angle D + \angle B = x + 180 - x = 180°$.
$ABCD$ is cyclic .

5) a) $CA = CP$ implies $\angle APC = 40°$

b) $\angle CPB = 180 - 40 = 140°$
Since $PBQC$ is a parallelogram $\angle BQC = 140°$

c) $\angle A + \angle Q = 40 + 140 = 180°$
$ABQC$ is cyclic.

6) a) Since AB is the diametre $\angle ACB = 90°$
$\angle B = 90 - 20 = 70°$

b) Since $ABCD$ is cyclic $\angle D = 180 - 70 = 110°$

c) In triangle ACD, $\angle D = 110°, AD = CD$.
$\angle A = \angle C = \frac{180-110}{2} = 35°$
Angles are $\angle A = 20 + 35 = 55°, \angle B = 70°, \angle C = 90 + 35 = 125°, \angle D = 110°$

7) a) $\angle A = 60°$, $ABDC$ is cyclic .
$\angle BDC = 180 - 60 = 120°$

b) $\triangle BCD$ൽ $\angle B + \angle C = 180 - 120 = 60°$
$\angle B = 20°, \angle C = 40°$

c) $\angle ABD = 60 + 20 = 80°, \angle ACD = 40 + 60 = 100°$

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

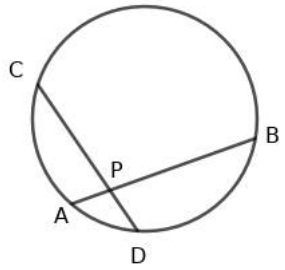
February 11, 2021

9

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ If chords of a circle AB and CD intersect at P then $PA \times PB = PC \times PD$

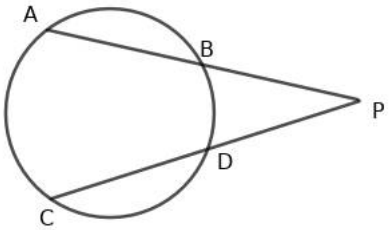
1) Chords AB and CD intersect at P.If $AB = 5$cm , $PB = 3$cm and $PD = 4$cm.



a) What is the length PA?

b) Find PC and CD

2) Chords AB and CD intersect at P outside the circle.If $AB = 5$cm, $PB = 3$cm, $PD = 4$cm.



a) Write the relation between PA, PB, PC and PD

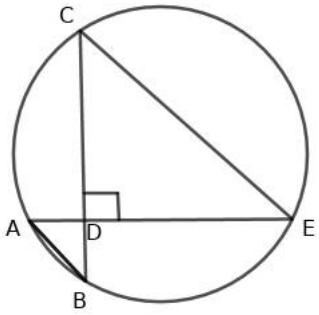
b) Find the length CD

3) AB and CD are two chords intersecting at a point P inside the circle such that $AP = CP$

   a) What is the relation between PB and PD?

   b) If the length of the chord AB is 10cm then what is the length of CD

4) In the figure AE and CB are perpendicular chords of a circle intersect at D inside the circle.If $AB = 5, BD = 4, AE = 15$ then

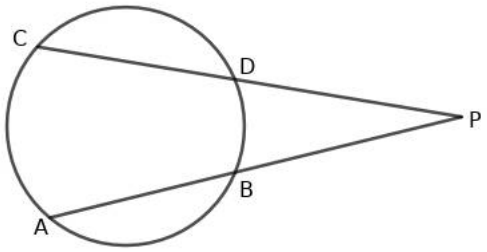


   a) Find the length AD

   b) Find the length DE

   c) Find the length CE

5) The chords of a circle AB anf CD intersect at P outside the circle.If $PA = PC$ then prove that $AB = CD$



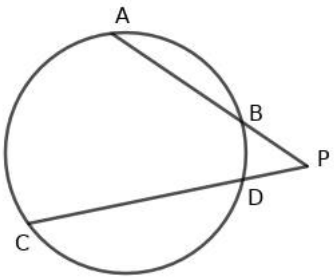
6) In the figure AB and CD are two chords of a circle which when produced meet at a point P

   a) Draw AC and BD , complete the quadrilateral $ABDC$

   b) Establish the similarity of the triangles PAC and PDB

   c) Establish the relation $PA \times PB = PC \times PD$

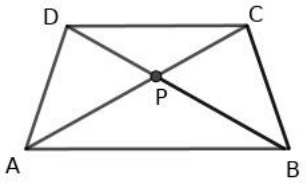
7) The chords AB and CD intersect at P outside the circle.



   a) What is the relation between PA, PB, PC and PD?

   b) If $AB = 5$cm , $PB = 3$cm , $PD = 2$cm then what is the length CD?

8) In the trapezium $ABCD$, $AD = BC$ and AB is parallel to CD . The diagonals AC and BD intersect at P.



a) What is the relation between $\angle ADB$ and $\angle ACB$? How can we realize this relation?

b) If $\angle DAC = 30°$then what is the measure of $\angle DBC$?

c) What is the relation between the segments made by$P$ on the diagonals?

SJ Focus Series

Answers

1) a) $AB = 5, PB = 3 \rightarrow PA = 5 - 3 = 2$

b) $PA \times PB = PC \times PD$
$2 \times 3 = PC \times 4, PC = \frac{6}{4} = \frac{3}{2} = 1.5$
$CD = PC + PD = 1.5 + 4 = 5.5$cm

2) a) $PA \times PB = PC \times PD$

b) $AB = 5, PB = 3 \rightarrow PA = 8$cm
$8 \times 3 = PC \times 4$
$PC = \frac{24}{4} = 6$cm
$CD = PC - PD = 6 - 4 = 2$cm

3) a) $PA \times PB = PC \times PD$
$PA = PC \rightarrow PB = PD$

b) $AB = PA + PB = PC + PD = CD$
$AB = CD \rightarrow CD = 10$cm

4) a) $AD = \sqrt{5^2 - 4^2} = \sqrt{9} = 3$

b) $DE = 15 - 3 = 12$

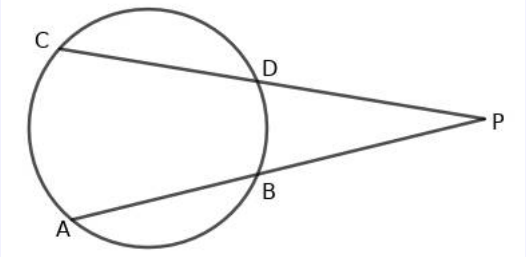
c) $DA \times DE = DB \times DC$
$3 \times 12 = 4 \times DC, DC = 9$
$\triangle CDE$ is a right triangle . $CE = \sqrt{9^2 + 12^2} = \sqrt{225} = 15$

5) ⋆ $PA \times PB = PC \times PD$

⋆ Since $PA = PC$. cancel from both sides . $PB = PD$

⋆ Since $PA = PC, PA - PB = PC - PD \rightarrow AB = CD$

6) a) Picture



b) $\angle ACD = x$ implies $\angle DBC = 180 - x, \angle DBP = x$
similarly if $\angle CAB = y$ then $\angle BDP = y$
Triangle ACP, triangle DBP are similar triangles

c) $\frac{PA}{PD} = \frac{PC}{PB} \rightarrow PA \times PB = PC \times PD$

7) a) $PA \times PB = PC \times PD$

b) $(5 + 3) \times 3 = PC \times 2$
$24 = 2 \times PC \rightarrow PC = 12$
$CD = PC - 2 = 12 - 2 = 10$

8) a) Since $ABCD$is isosceles it is cyclic .
A, B, C, D passes through the vertices. Angles formed by the arc AB in the complement are equal.$\angle ADB, \angle ACD$.These are equal angles
$\angle ADB = \angle ACD$

b) Arc CD makes the angles $\angle DAC, \angle DBC$in the complement.These are equal
Since $\angle DAC = 30^\circ$ then $\angle DBC = 30^\circ$

c) AC and BD are diagonals . These are the chords of the circle passing through the vertices . These chords intersect at P.
$PA \times PC = PB \times PD$

[1]

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

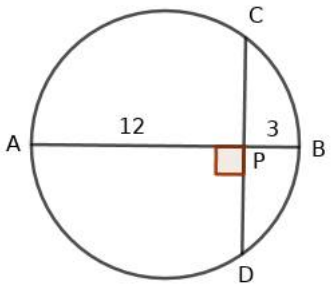
February 12, 2021

10

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ If chords of a circle AB and CD intersect at P then $PA \times PB = PC \times PD$

1) AB is the diametre of a circle . CD is a chord perpendiculat to AB intersect at P.If $PA = 12, PB = 3$ then

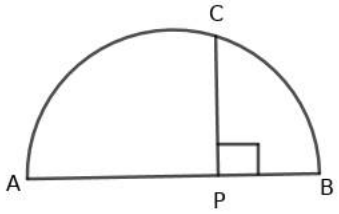


a) What is the length PC?

b) What is the length of the chord CD?

c) What is the area of the square drawn on CD as the side?

2) AB is the diametre of a semicircle, P is a point on AB and PC is perpendicular to AB

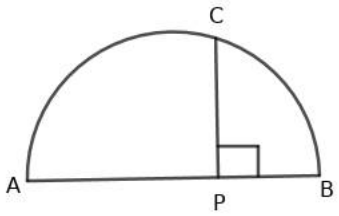


a) Prove that $PA \times PB = PC^2$

b) If$PA = 9$cm , $PB = 4$ cm then what is the length PC?

c) What is the area of the square with side PC?

3) AB is the diametre of a semicircle, P is a point on AB and PC is perpendicular to AB

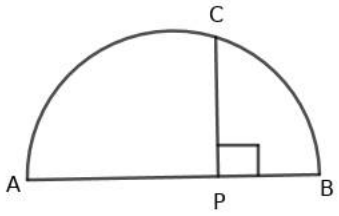


a) If $PC = 6$cm,and $PB = 3$cm then what is the length of PA

b) What is the radius of the circle ?

c) What is the area of the square drawn with side PC?

4) In the figure AB is the diametre of the semicircle, PC is perpendicular to AB. $AC = 5\sqrt{29}$cm and $PA = 25$cm.



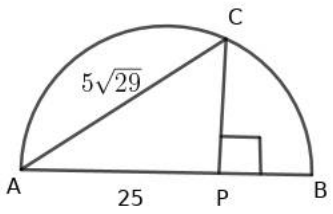
a) What is the length of PC?

b) What is the lenght PB?

c) What is the radius of the circle?

5) Draw a semicircle of suitable diametre .Construct a line of length $\sqrt{12}$cm perpendicular to the diametre whose one end is on the diameter and other end is on the semicircle.Explain the principle of construction.

6) In the figure AB is the diametre of the circle and PC is perpendicular to the diametre. $PA : PB = 2 : 1$ and $PC = 6$cm.



a) Write the relation between PA, PB and PC?

b) Find the lengths PA and PB

c) What is the radius of the circle?

7) a) Draw an equilateral triangle of altitude 3 cm

b) What is the lenght of one side ?

c) What is the radius of its incircle?

8) Draw a rectangle of sides 5cm and 3cm .Construct a square whose area is same as the area of the rectangle

9) a) Draw a semicircle of suitable diametre .Draw a line of length $\sqrt{12}$cm whose one end on AB and other end on the semicircle.

b) Draw a chord of length $\sqrt{48}$ cm by make the semicircle as the circle

Answers

1) a) $PA \times PB = PC^2$
$PC^2 = 12 \times 3 = 36, PC = \sqrt{36} = 6$cm

b) $CD = 2 \times PC = 12$cm

c) Area$= CD^2 = 12^2 = 144$cm

2) a) Draw AC, BC. Consider $\triangle APC$ and $\triangle BPC$.If $\angle PAC = x$ then $\angle PCA = 90 - x$, $\angle PCB = 90 - (90 - x) = x, \angle PBC = 90 - x$
These triangles are similar triangles.The sides opposite to equal angles are proportional.
$\frac{PC}{PB} = \frac{PA}{PC}$
$PA \times PB = PC^2$.

b) $PC^2 = 9 \times 4 = 36, PC = 6$cm

c) Area $PC^2 = 36$sq.cm

3) a) $PA \times PB = PC^2$
$PA \times 3 = 6^2, PA = 12$cm

b) $AB = 12 + 3 = 15$cm.Radius 7.5cm .

c) Area $PC^2 = 36$sq.cm

4) a) $PC = \sqrt{(5\sqrt{29})^2 - 25^2} = 10$cm

b) $PA \times PB = PC^2$,$25 \times PB = 10^2, PC = 4$cm

c) $AB = 25 + 4 = 29$, radius$= 14.5$cm

5) a) Consider two natural numbers such that the product is 12 .
$12 = 6 \times 2$, diametre $= 6 + 2 = 8$cm .
Draw a line of length 8cm and make it the diametre of the circle.

b) Mark a point P at the distance 6cm from A on the diametre.Draw a perpendicular from P .The perpendicular line cut the semicircle at C

c) $PC^2 = PA \times PB = 6 \times 2 = 12$
$PC = \sqrt{12}$cm

6) a) $PA \times PB = PC^2$

b) If $PB = x$ then $2x \times x = 6^2$,$2x^2 = 36, x^2 = 18, x = \sqrt{18} = \sqrt{9 \times 2} = 3\sqrt{2}$
$PA = 6\sqrt{2}, PB = 3\sqrt{2}$

c) $AB = 6\sqrt{2} + 3\sqrt{2} = 9\sqrt{2}$
Radius $= \frac{9\sqrt{2}}{2}$cm

7) a) Draw a line AD of length 4cm. Draw a circle with diametre AD.Mark a point Pat a distance 3cm from A. From P draw a line perpendicular toAD. This line cut the circle at C, B .Draw triangle ABC.
$PC^2 = 3 \times 1, PC = \sqrt{3}, BC = 2\sqrt{3}$cm
$AC = \sqrt{3^2 + \sqrt{3}^2} = \sqrt{12} = 2\sqrt{3}$cm.
$AB = 2\sqrt{3}$cm . $AB = BC = AC = 2\sqrt{3}$cm

b) $AB = AC = BC = 2\sqrt{3}$

8) $\star$ Draw the quadrilateral $ABCD$. $AB = 5$cm , $BC = 3$cm.

$\star$ Produce AB and mark the point E such that $BC = BE$

$\star$ Draw a semicircle of diametre AE.Produce BC, meet the semixircle at F.

- ⋆ $BA \times BE = BF^2$ can be written as $AB \times BC = BF^2$. $AB \times BC$ is the area of the rectangle
- ⋆ Draw a square of side BF.Area of rectangle is equal to the area of the square as per the relation $AB \times BC = BF^2$

9) ⋆ Take two numbers with product 12, draw a circle with diameter as the sum of these numbers .$12 = 6 \times 2$, diametre $= 6 + 2 = 8$cm .
Draw a line of $AB = 8$cm. Draw a circle with this line as the diametre
Mark a point P at the diatance 6cm from A, draw a perpendicular line from $P$to the diametre .This line cut the semicircle at C.
$PC^2 = PA \times PB = 6 \times 2 = 12$
$PC = \sqrt{12}$cm

⋆ Make semicircle as the circle . Produce CP in such a way as the meet the circle at D.
$CD = 2\sqrt{12} = \sqrt{2^2 \times 12} = \sqrt{48}$cm

[1]

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 13, 2021

11

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Calculation of probability as a number.

1) A vessel contains 3 black beads and 2 white beads. One is taken from the vessel without looking into the vessel.
   a) What is the probability of getting black bead?
   b) What is the probability of getting white bead?

2) A box contains 10 cards on which one of the numbers $1, 2, 3 \cdots 10$ is written in each card.One card is taken from the box at random.
   a) What is the probability of getting a an even numbered card
   b) What is the probability of getting an odd numbered card?
   c) What is the probability of getting a card on which a prime number is written ?
   d) What is the probability of getting a perfect square on the card.

3) Each of the numbers from 1 to 100 are written on small paper pieces .One is taken from the card at random.
   a) How many perfect squared cards are there in the box?
   b) What is the probability of getting a perfect squared card?
   c) What is the probability of getting an even numbered card?കിട്ടുന്നത് ഇരട്ടസംഖ്യയായ പൂർണ്ണവർഗ്ഗം ആകാനുള്ള സാധ്യത എത്ര?
   d) What is the probability of getting an odd numbered card?
   e) What is the probability of not getting a perfect numbered card?

4) A die in which the numbers 1 to $6$are written on the faces is thrown
   a) What is the probability of falling an even numbered face?
   b) What is the probability of getting an odd numbered face ?
   c) What is the probability of getting a prime numbered face?

5) Two digit numbers are written in small paper pieces and placed in a box.One is taken from the box at random
   a) How many multiples of 5 are there in the box?
   b) What is the probability of getting a multiple of 5?
   c) What is the probability of not getting a multiple of 5?

6) Numbers $1, 2, 3 \cdots 17$ are written in small paper cards and placed in a box.One card is taken from the box at random.

   a) What is the probability of getting odd numbered card?
   b) What is the probability of getting prime numbered card?
   c) What is the probability of getting a multiple of 3?
   d) What is the probability of getting a multiple of 2 and 3?

7) A die numbered 1 to 6 are thrown.

   a) What is the probability of falling a number less than 4?
   b) What is the probability of getting a multiple of 2?
   c) What is the probability of falling a multiple of both 2 and 3
   d) What is the probability of not falling a prime number?

8) Integers from -4 to 4 are written in small paper pieces and placed in a box. One is drawn from the box at random .If the outcome is denoted by x,

   a) What is the probability of getting a number satisfying the condition $\mid x \mid < 2$?
   b) What is the probability of getting a number satisfying the condition $\mid x \mid \leq 2$?
   c) What is the probability of getting a number satisfying the condition $\mid x \mid \geq 3$?
   d) What is the probability of getting a number satisfying the condition $\mid x \mid \leq 3$?

9) Two dice numbered 1to6 are thrown at together.

   a) Write the outcomes as pairs
   b) What is the probability of the occurence of equal numbers ?
   c) What is the probability of the occurence of perfect squares ?
   d) What is the probability of the occurence of multiple of 2 in one die and multiple of 3 in other die ?

10) What is the probability of getting 5 Sundays in the month December?

SJ Focus Series

Answers

1) a) Probablility of getting black bead $= \frac{3}{5}$
   a) probability of getting white bead $= \frac{2}{5}$

2) a) Probability of getting even number $= \frac{5}{10}$
   b) Probability of getting odd number $= \frac{5}{10}$
   c) Probability of getting prime number$= \frac{4}{10}$
   prime numbers are$2, 3, 5, 7$
   d) Probability of getting perfect squares $= \frac{3}{10}$
   Perfect squares $1, 4, 9$

3) a) Number of perfect squares 10
   b) Probability of getting perfect squares $= \frac{10}{100} = \frac{1}{10}$
   c) Probability of getting even perfect squares $= \frac{5}{100} = \frac{1}{20}$
   d) Probabilitry of getting odd perfect squares $= \frac{5}{100} = \frac{1}{20}$
   e) Probability of getting a non perfect square $1 - \frac{1}{10} = \frac{9}{10}$

4) a) Probability of getting even numbered face $= \frac{3}{6} = \frac{1}{2}$

b) Probability of getting odd numbered face $= \frac{3}{6} = \frac{1}{2}$

c) Probability of getting prime numbered face $= \frac{3}{6} = \frac{1}{2}$

5) a) $10, 11, 12 \cdots 99$ These are two digit numbers . Number of two digit numbers 90
Multiples of 5 are $10, 15, 20 \cdots 95$
Number of multiples $= 18$

b) Probability of getting a multiple of $5 = \frac{18}{90}$

c) Probability of not getting a multiple of 5 $1 - \frac{18}{90} = \frac{72}{90}$

6) a) $\frac{9}{17}$

b) $\frac{7}{17}$

c) $\frac{5}{17}$

d) $\frac{2}{17}$

7) a) $\frac{3}{6}$

b) $\frac{3}{6}$

c) $\frac{1}{6}$

d) $\frac{3}{6}$

8) a) $\frac{3}{9}$

b) $\frac{5}{9}$

c) $\frac{4}{9}$

d) $\frac{7}{9}$

9) a) $(1,1), (1,2), (1,3), (1,4), (1,5), (1,6)$
$(2,1), (2,2), (2,3), (2,4), (2,5), (2,6)$
$(3,1), (3,2), (3,3), (3,4), (3,5), (3,6)$
$(4,1), (4,2), (4,3), (4,4), (4,5), (4,6)$
$(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)$
$(6,1), (6,2), (6,3), (6,4), (6,5), (6,6)$

b) $\frac{6}{36}$

c) $(1,1), (1,4), (4,1), (4,4)$.
Probabilitry $\frac{4}{36}$

d) $(2,3), (4,3), (6,3), (2,6), (4,6), (6,6), (3,2), (3,4), (3,6), (6,2), (6,4)$
Probability $\frac{11}{36}$

10) There are 31 days in December. 28 days decide 4 weeks ,so four Mondays.
The combinations are(Sunday, Monday,Tuesday),(Monday,Tuesday ,Wednesday),(Tuesday, Wednesday ,Thursday),
(Wednesday, Thusday, Friday),(Thusday, Friday ,Saturday),(Friday, Saturd

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

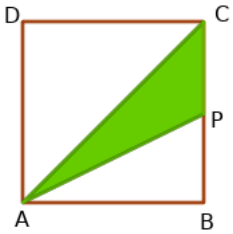
February 23, 2021

12

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■Area and Probability.

1) ACP is drawn in the square $ABCD$ and shaded .$P$is the mid point of the side of the square

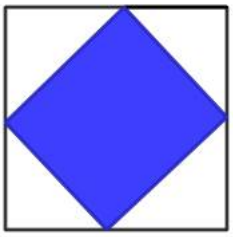


a) If the side of the square is a then what is the altitude to the side PC of the shaded triangle.

b) If the side of the square is a then what is the area of the shaded triangle ?

c) If a fine dot is placed into the figure then what is the probability of falling the dot in the shaded triangle ?

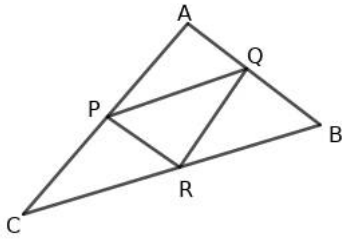
2) A square is drawn by joining the mid points of the sides of another square.The inner square is shaded blue.



a) Divide the triangle into eight equal triangles by drawing two lines

b) A fine dot is placed into the figure. What is the probability of falling the dot in the inner square?

3) Triangle PQR is drawn by joining the mid points of the sides of triangle ABC.



a) How many equal triangles are there in the figure?

b) A fine dot is placed into the figure. What is the probability of falling the dot in triangle PQR?

c) How many parallelograms are there in the picture?

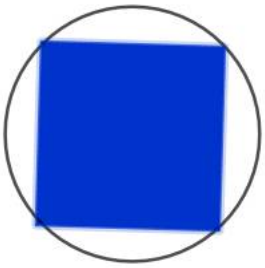
d) A fine dot is placed into the figure. What is the probability of falling the dot in the parallelogram $PQRC$?

4) A triangle is drawn by joining the alternate vertices of a regular hexagon.

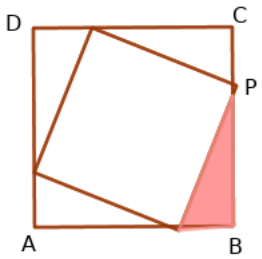
a) Divide the figure into 6 equal triangles

b) If a fine dot is placed into the figure , what is the probability of falling the dot in the shaded triangle?

5) A square is drawn in a circle . The vertices of the square are on the circle. A fine dot is placed into the figure at random. What is the probability of falling the dot in the shaded square.



6) There are two squares in the figure.The perimetre of the outer square is 28cm, the perimetre of the inner square is 20cm



a) What is the area of the outer square?

b) What is the area of inner square?

c) What is the area of the shaded triangle ?

d) If a fine dot is placed into the figure then what is the probability of falling the dot in the shaded triangle?

7) The mid points of the two sides and one vertex of a square are joined in such a way as to get a triangle which is coloured in the picture.

a) If the side of the square is a, what is are of unshaded triangles ?

b) What is the area of the shaded triangle?

c) If a fine dot is placed into the figure then what is the probability of falling the dot in the coloured traingle?

SJ Focus Series

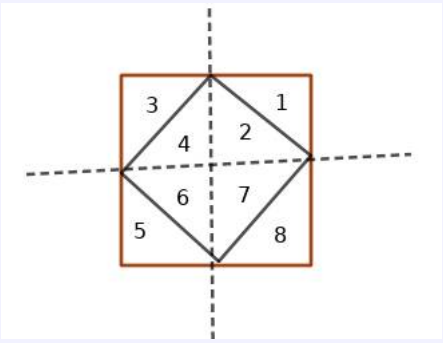
Answers

1) a) Altitude to the side PC is AB.$AB = a$
altitude $= a$

b) Base of triangle APC is $= \frac{a}{2}$,Height $= a$
Area $= \frac{1}{2} \times \frac{a}{2} \times a = \frac{a^2}{4}$

c) Probability$= \frac{a^2}{4} \div a^2 = \frac{1}{4}$

2) a) Look at the picture



b) Among eight equal triangles ,four of them determine the shaded square.ന്നായതു$\frac{4}{8} = \frac{1}{2}$

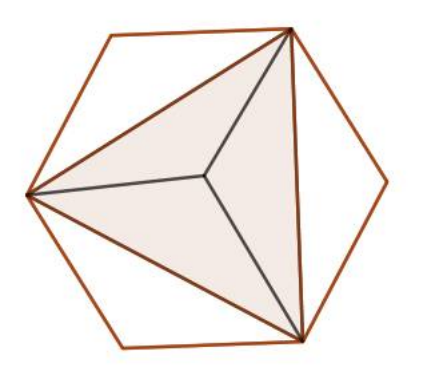
3) a) There are 4equal triangles .
$\triangle PQR, \triangle APQ, \triangle PCR, \triangle QRB$are .

b) $\frac{1}{4}$(Area of equal triangles are equal)

c) There are 3 parallelograms .
$PQRC, PQBR, PRQA$ are equal parallelograms .

d) To fall the dot in the parallelogram $PQRC$ it should either be in triangle PCR or triangle PQR
Probability is $\frac{2}{4} = \frac{1}{2}$

4) a) Figure



b) Among six equal triangles ,three make the shaded triangle .
Probability= $\frac{3}{6} = \frac{1}{2}$

5) ⋆ If one side of the square a the diagonal is $d = \sqrt{a^2 + a^2} = \sqrt{2}a$
Radius of the circle is $\frac{a\sqrt{2}}{2} = \frac{a}{\sqrt{2}}$

⋆ Area of the square a^2, area of the circle $\pi \times (\frac{a}{\sqrt{2}})^2 = \frac{\pi a^2}{2}$

⋆ Probability of falling the dot in the shade is $= a^2 \div \frac{\pi a^2}{2} = \frac{2}{\pi}$

6) a) One side of outer square $= \frac{28}{4} = 7$cm
Area= $7^2 = 49$sq.cm

b) One side of inner square $\frac{20}{4} = 5$cm
Area $5^2 = 25$sq.cm

c) Sum of the area of the triangles in between the squares is
$49 - 25 = 24$sq.cm
Area of shaded part= $\frac{24}{4} = 6$sq.cm

d) Probability= $\frac{6}{49}$

7) a) Triangle PMQ, Triangle ADQ are similar triangles .Height PM
$\frac{h}{a} = \frac{a+\frac{a}{2}}{a}$
$h = \frac{3a}{2}$

b) Area of triangle PQR is $= \frac{1}{2} \times QR \times PM = \frac{1}{2} \times 3a \times \frac{3a}{2} = \frac{9a^2}{4}$

c) Probability= $\frac{4}{9}$

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 28, 2021

13

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■How to develop a second degree equation in a suitable situation?

1) Form the equations in the following cases.
   a) The sum of a number and its square is 12
   b) When a number is subtracted from its square results 20
   c) The sum of the square of a number and two times that number is 63
   d) Product of two consecutive odd numbers is 63.
   e) The sum of a number and its reciprocal is $\frac{10}{3}$.
2) The square of a number is 16.
   a) What are the numbers ?
   b) Take the number as x and form an equation
   c) Can the square of a real number -16? Explain.
3) The sum of a number and its square is 30.
   a) If the number is x, form an equation.
   b) What is the positive number$x$ാ?
   c) Can more than one number satisfying this condition?
4) x is an odd number greater than 1.
   a) What are the odd numbers nearer to x
   b) If the product of those numbers is 45, form an equation.
   c) Find the numbers.
5) If the sides of a square are reduced by 1 , the area becomes 100.
   a) If the side of the first square before reducing is x, form an equation.
   b) Find the side of the square.
   c) What will be the perimetre of the new square.
6) Consider two adjacent even numbers
   a) If one of them is x then what is the other?
   b) If the product is 120 then write a second degree equation.
   c) Convert this equation as a completed square by suitable changes
   d) Find the numbers .

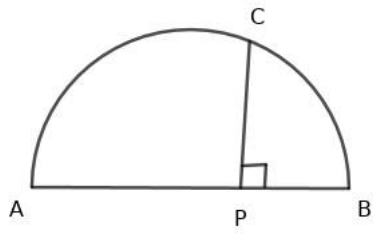
7) Length of a rectangle is 8 more then its breadth.

   a) If the breadth is x then what is its length?

   b) If the area is 240 sq.cm form a second degree equation.

   c) Calculate the lenght and breadth

8) In the figure AB is the diametre of the semicircle. AB is perpendicular to PC.Also,$AP = BP + 5$, $PC = 6$.



   a) Write the relation between the lenghts PA, PB and PC

   b) If $PB = x$ then write an equation connecting the lenghts PA, PB and PC

   c) What is the length of PB?

   d) What is the radius of this circle.

9) Consider the sequence of even numbers $2, 4, 6, 8 \cdots$.

   a) What is its algebraic form?

   b) How many terms from the beginning in the order makes the sum 210?

SJ Focus Series

Answers

1) a) If x is the number then $x^2 + x = 12$

   b) If x is the number then $x^2 - x = 20$

   c) If $x$is the number then $x^2 + 2x = 63$

   d) If the numbers are $x, x + 2$ then $x(x + 2) = 63, x^2 + 2x = 63$

   e) If the number is $x$then $x + \frac{1}{x} = \frac{10}{3}$
   $\frac{x^2+1}{x} = \frac{10}{3}$
   $3(x^2 + 1) = 10x$,

$$3x^2 - 10x + 3 = 0$$

2) a) Numbers are $4, -4$

   b) If x is the number $x^2 = 16$

   c) No number has a negative square. Square of -4 and the square of $+4$ is 16.

3) a) If the number is $x$then $x^2 + x = 30$

   b) $x = 5$

   c) $5^2 + 5 = 30, (-6)^2 + (-6) = 30$. Numbers are $5, -6$

4) a) If one odd number is x then second number is $x - 2, x + 2$

   b) $(x - 2)(x + 2) = 45$
   $x^2 - 4 = 45, x^2 = 49$

c) $x = 7$
Numbers are $5, 9$

5) a) If one side is $x$then $(x-1)^2 = 100$

b) $x - 1 = \sqrt{100} = 10$,$x = 11$

c) Parimetre is reduced by 4

6) a) $x + 2$

b) $x(x+2) = 120$
$x^2 + 2x = 120$

c) Add 1on both sides $x^2 + 2x + 1 = 120 + 1$
$(x+1)^2 = 121$

d) $x + 1 = \sqrt{121} = 11, 11, x + 1 = 11, x = 10$
Even numbers are $10, 12$

7) a) Length $= x + 8$

b) $x(x+8) = 240, x^2 + 8x = 240$

c) Add $(\frac{8}{2})^2$ on both sides
$x^2 + 8x + 16 = 240 + 16$
$(x+4)^2 = 256, x + 4 = \sqrt{256} = 16, x = 16 - 4 = 12$
Breadth 12 cm,length $12 + 8 = 20$cm

8) a) $PA \times PB = PC^2$

b) $(x+5) \times x = 6^2, x^2 + 5x = 36$
$x^2 + 5x + (\frac{5}{2})^2 = 36 + (\frac{5}{2})^2$
$(x + \frac{5}{2})^2 = 36 + \frac{25}{4}$
$(x + \frac{5}{2})^2 = \frac{169}{4}$
$(x + \frac{5}{2}) = \sqrt{\frac{169}{4}} = \frac{13}{2}$
$x = \frac{13}{2} - \frac{5}{2} = 4$

c) $PB = 4$
$AP = 4 + 5 = 9, AB = 9 + 4 = 13$
Radius $= 12$cm

9) a) $x_n = 2n$

b) $n(n+1) = 210, n^2 + n = 210$
$n^2 + n + \frac{1}{4} = 210 + \frac{1}{4}$
$(n + \frac{1}{2})^2 = \frac{841}{4}$
$n + \frac{1}{2} = \sqrt{\frac{841}{4}} = \frac{29}{2}$
$n = \frac{29}{2} - \frac{1}{2} = 14$
Sum of 14 even numbers is 210

[1]

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 28, 2021

14

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Problems related to squares and rectangles

1) One side of a rectangle is 3 more than the other side.Area is calculated 108 sq.cm

   a) If one side is x then what is the other side?
   b) Form a second degree equation using the given conditions.
   b) Find the sides of the rectangle.
   c) What is the length of the diagonal?

2) A rectangular stip of small side 2 cm is removed from a square sheet .
   Removed rectangle is shaded in the figure. Area of the remaining part which is a rectangle in shape is 80 sq.cm

   a) If one side of the square is x then what is the small side of the unshaded rectangle?
   b) Find x by solving a second degree equation obtained from the given conditions.
   c) What is the area of the shaded rectangular strip?

3) The perimetre of a rectangle is 64cm. Area 240 sq.cm

   a) What is the sum of its length and breadth?
   b) Form a second degree equation by taking one side as x
   c) Calculate the sides of the rectangle.

4) Sum of the area of two squares is 41sq.cm , the difference of the sides is 1

   a) If the side of the small square is x then what is the side of the big square?
   b) Form a second degree equation using the given conditions.
   c) Find the side of each square.

5) Sides of three squares are consecutive natural numbers.Sum of the area of these squares is 194

   a) The side of the small square is x what is the side of other two squares?
   b) Form a second degree equation using the given conditions.
   c) Calculate the side of these squares.

6) Is it possible to draw a rectangle of area 5 sq.unit and perimetre 8 unit. Justify your answer .

7) Breadth, length and diagonal of a rectangle are in an arithmetic sequence with common difference 2. Area of the rectangle is 48 sq.cm

   a) If the breadth is x what is length and diagonal

   b) Form a second degree equation and find its breadth and length

   c) Calculate the perimetre of the rectangle.

SJ Focus Series

Answers

1) a) $x+3$

   b) $x(x+3)=108, x^2+3x=108$

   c) $x^2+3x+(\frac{3}{2})^2=108+(\frac{3}{2})^2$
   $(x+\frac{3}{2})^2=108+\frac{9}{4}=\frac{441}{4}$
   $x+\frac{3}{2}=\frac{21}{2}, x=9$
   sides are 9cm , 12cm

   d) Diagonal $=\sqrt{9^2+12^2}=\sqrt{225}=15$cm

2) a) $x-2$

   b) $x(x-2)=80, x^2-2x=80, x^2-2x+1=81$
   $(x-1)^2=81\rightarrow x-1=9, x=10$

   c) Sides 10cm 2cm.Area of the rectangle 20sq.cm

3) a) Length $+$breadth$=32$

   b) If x is the length ,breadth $32-x$
   $x(32-x)=240, 32x-x^2=240, -x^2+32x=240$
   $x^2-32x+256=-240+256, x^2-32x+256=16$
   $(x-16)^2=16, x-16=4, x=20.$

   c) Sides 20cm , $32-20=12$cm

4) a) Sides $x$cm , $x+1$cm

   b) $x^2+(x+1)^2=41, x^2+x^2+2x+1=41, 2x^2+2x=40, x^2+x=20$

   c) $x^2+x+\frac{1}{4}=20+\frac{1}{4}, (x+\frac{1}{2})^2=\frac{81}{4}, x+\frac{1}{2}=\frac{9}{2}, x=\frac{9}{2}-\frac{1}{2}=\frac{8}{2}=4$
   Sides 4cm , 5cm

5) a) $x+1, x+2$

   b) $x^2+(x+1)^2+(x+2)^2=194$
   $x^2+x^2+2x+1+x^2+4x+4=194$
   $3x^2+6x+5=194, 3x^2+6x=189, x^2+2x=63$

   c) $x^2+2x+1=64, (x+1)^2=64, x+8, x=7$
   Sides 7cm, 8cm,9cm

6) $\star$ Length $+$breadth $=4$, length $\times$ breadth $=5$

   $\star$ If length$x$ is the length then width $4-x$
   $x(4-x)=5, 4x-x^2=5, -x^2+4x=5, x^2-4x=-5$

   $\star$ $x^2-4x+4=-5+4=-1$
   $(x-2)^2=-1$. Square of a number cannot be a negative number. So $x-2$is not a real number . That is $x$is not a real number.Rectangle cannot be drawn

7) a) Length $x+2$,diagonal $x+4$

b) $x(x+2)=48, x^2+2x=48, x^2+2x+1=49, (x+1)^2=49, x+1=7, x=6$
breadth 6cm , length 8cm

c) perimetre 28cm

[1]

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

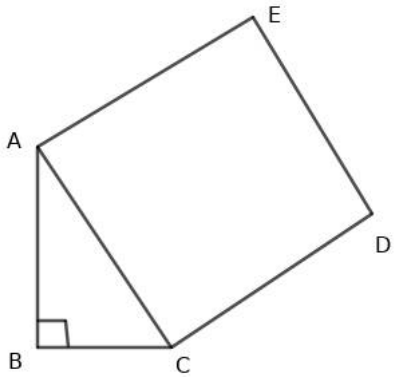
February 17, 2021

15

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ $30^\circ - 45^\circ - 90^\circ$ ത്രികോണവും $45^\circ - 45^\circ - 90^\circ$ത്രികോണവും

1) Consider a square of perimetre 40cm
   a) What is the length of its side?
   b) What is the length of its diagonal
   c) What is the area of the square drawn on its diagonal?
2) The area and perimetre of a square are equal in number.
   a) What is the length of its side?
   b) What is the length of its diagonal?
   c) What is the area of the square drawn on its diagonal?
3) A bridge of length 600m is built across a river making 45° angle with the direction of flow.
   a) Draw a rough diagram.
   b) What is the width of the river?
4) In traingle ABC ,$\angle A = 30^\circ$, $BC = 10$cm



   a) What is the length AB?

b) What is the length of the side AC?

c) What is the length of the diagonal of the square drawn on AC?

d) What is the perimetre of the square?

5) Consider an equilateral triangle of side 10cm

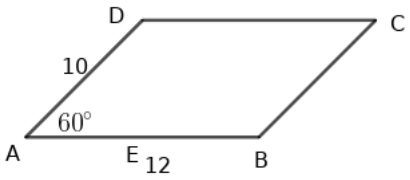
a) What is its altitude?

b) Draw a rough diagram of the square drawn on the altitude

c) What is the area of this square.

d) What is the length of its diagonal?

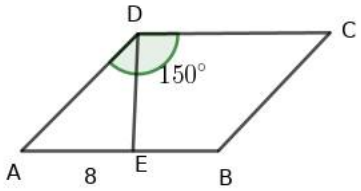
6) In the parallelogram $ABCD$,$\angle A = 60°$., $AB = 12$cm , $AD = 10$cm



a) What is the perpendicular distance from D to AB.

b) Find the area of the parallelogram

7) In the rhombus $ABCD$,$\angle D = 150°$



a) What is the measure of $\angle A$?

b) What is the diatance between AB and CD

c) Find the area of the rhombus.

SJ Focus Series

Answers

1) a) Length of one side $= \frac{40}{4} = 10$cm

b) Two sides and the diagonal form a $45°, 45°, 90°$ right triangle .
The side opposite to $45°$ is 10cm.
$\therefore$ the side opposite to $90°$ is $10\sqrt{2}$cm

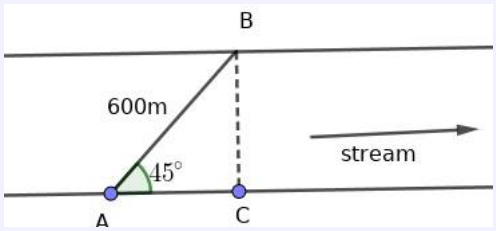
c) Area $= (10\sqrt{2})^2 = 100 \times 2 = 200$ sq.cm

2) a) $4a = a^2 \Rightarrow a = 4$

b) Length of the diagonal is $4\sqrt{2}$

c) Area of the square drawn on the diagonal is $(4\sqrt{2})^2 = 16 \times 2 = 32$ sq.unit

3) a) Rough diagram is drawn below



b) Width of the river $BC = \frac{600}{\sqrt{2}}$metre.

4) a) In a $30-60-90$ triangle ,side opposite to 30° is 10cm
Therefore side opposite tos 60° is $10\sqrt{3}$cm

b) Side opposite to 90° is 20cm

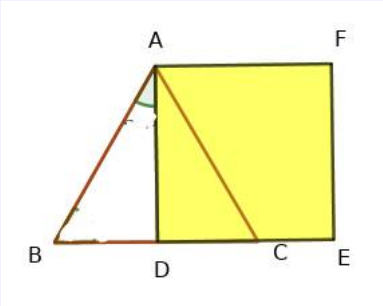
c) Length of diagonal of the square is $20\sqrt{2}$cm

d) Perimetre$= 4 \times 20\sqrt{2} = 80\sqrt{2}$cm

5) a) $\triangle ABD$ ഒരു $30-60-90$ മട്ടത്രികോണമാണ്. AD വികർണ്ണം . $AD = 5\sqrt{3}$സെ.മീറ്റർ

a) $\triangle ABD$ is a $30-60-90$ triangle. AD is the altitude. $AD = 5\sqrt{3}$cm

b) Figure

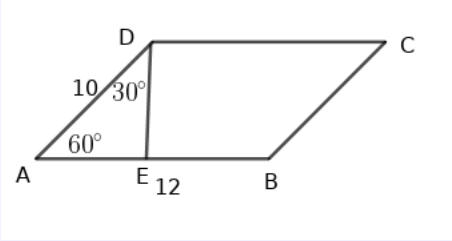


c) Area $= (5\sqrt{3})^2 = 25 \times 3 = 75$ sq.cm

d) Length of the diagonal is $5\sqrt{3} \times \sqrt{2} = 5\sqrt{6}$cm

6) a) ചിത്രം നോക്കുക

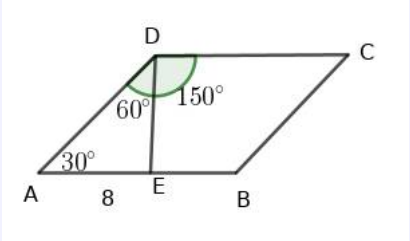
a) Look at the picture



$\angle D = 120^\circ, \angle A = 180 - 120 = 60^\circ$
$\triangle AED$ is a $30^\circ - 60^\circ - 90^\circ$ triangle .The side opposite to $90^\circ$is 10cm .Therefore $AE = 5, DE = 5\sqrt{3}$cm .

b) Area $AB \times DE = 12 \times 5\sqrt{3} = 60\sqrt{3}$sq.cm

7) a) Look at the picture



$\angle A = 180 - 150 = 30^\circ$

Draw a line DE perpendicular to AB

Triangle AED is a $30^\circ - 60^\circ - 90^\circ$triangle

The side opposite to 90° is 8cm .The side opposite to 30° is 4cm

b) Area $= AB \times DE = 32$sq.cm

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 18, 2021

16

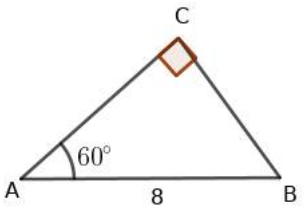
(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ $sine$, $cosine$എന്നീ കോണളവുകൾ

1) If $\sin A = \frac{3}{5}$then what is $\cos A$?

(a) $\frac{4}{5}$ (b) $\frac{3}{4}$ (c) $\frac{1}{4}$ (d) $\frac{2}{5}$

2) In the figure given below $AB = 8$ cm.If BC is perpendicular to AC then



a) What is the length AC?

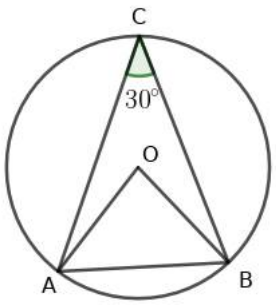
b) What is the length BC?

3) Perimetre of an equilateral triangle is 30cm

a) What is the length a side?

b) What is the altitude of this equilateral triangle?

4) In the figure O is the centre of the circle.$\angle ACB = 30°$



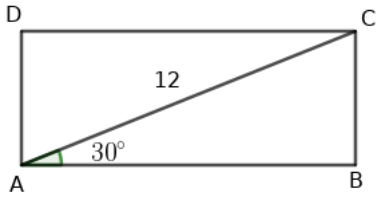
a) What is the measure of $\angle AOB$?

b) What kind of triangle is OAB?

c) If the radius of the circle is 12cm then what is the altitude of triangle OAB?

d) What is the area of triangle OAB?

5) The diagonal of the rectangle ABC is 12cm , $\angle BAC = 30°$

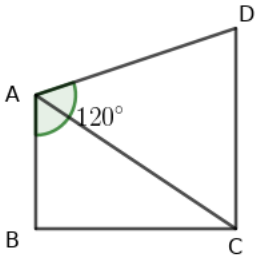


a) What is the length of the side AB?

b) What is the length of the side BC?

c) Calculate the area of the rectangle

6) $ABCD$ is a quadrilateral .$AC = CD = AD$,$\angle BAD = 120°$, $\angle B = 90°$,The perpendicular distance from D to the diagonal AC is 12cm .



a) What is the length of AC?

b) What are the angles of triangle ABC ?

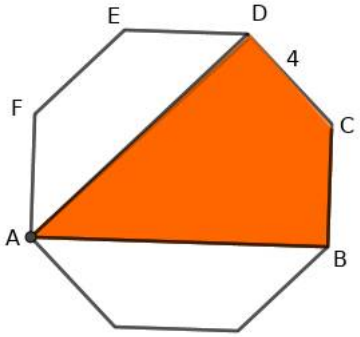
c) What are the length AB and BC

d) Find the area of triangle ABC.

e) Find the area of triangle ADC.

f) Find the area of the quadrilateral $ABCD$

7) There is a regular octagon of side 4cm . A quadrilateral is shaded .



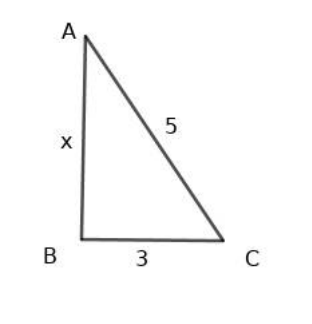
a) What is the measure of $\angle C$?

b) What is the length rectangle $ABCF$

c) Calculate the area of the coloured region.

Answers

1) Look at the picture

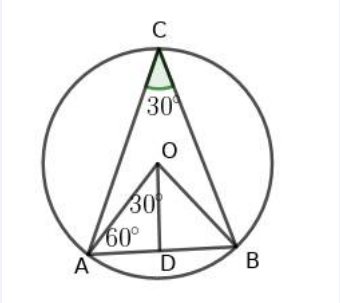


$x = \sqrt{5^2 - 3^2} = 4$
$\cos A = \frac{4}{5}$

2) a) $\sin 60° = \frac{BC}{8}, \frac{\sqrt{3}}{2} = \frac{BC}{8}, 8\sqrt{3} = 2 \times BC, BC = 4\sqrt{3}$cm
b) $\cos 60° = \frac{AC}{8}, \frac{1}{2} = \frac{BC}{8}, AC = 4$cm

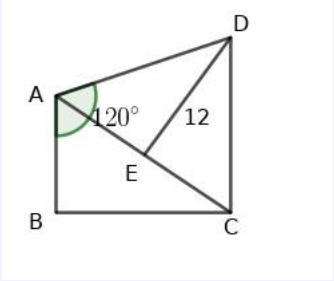
3) a) Side $\frac{30}{3} = 10$cm
b) Altitude $5\sqrt{3}$cm

4) a) $\angle AOB = 60°$
b) $OA = OB$, In triangle OAB angles opposite to equal sides are equal. Each angle is $60°$.
Equilateral triangle
c) figure



Draw ODperpendicular to AB.
Triangle ODA is a $30° - 60° - 90°$triangle.
Side opposite to $90°$is 12cm .Side opposite to $30°$is 6cm . $OD = 6\sqrt{3}$cm
d) Area $\frac{1}{2} \times 12 \times 6\sqrt{3} = 36\sqrt{3}$sq.cm

5) a) Triangle $ABC$is a $30° - 60°, 90°$triangle .
Side opposite to $90°$ is 12cm
side opposite to $30°$is 6cm , $AB = 6\sqrt{3}$cm
b) $BC = 6$cm
c) Area $AB \times BC = 36\sqrt{3}$sq.cm



6)

$DE = 12, AE = \frac{12}{\sqrt{3}}$

$AC = 2 \times \frac{12}{\sqrt{3}} = \frac{24}{\sqrt{3}}$

b) $\angle B = 90°, \angle A = 120 - 60 = 60°, \angle C = 30°$

c) $AB = \frac{12}{\sqrt{3}}, BC = 12.$

d) Area of ABC is $= \frac{1}{2} \times 12 \times \frac{12}{\sqrt{3}} = \frac{72}{\sqrt{3}}$

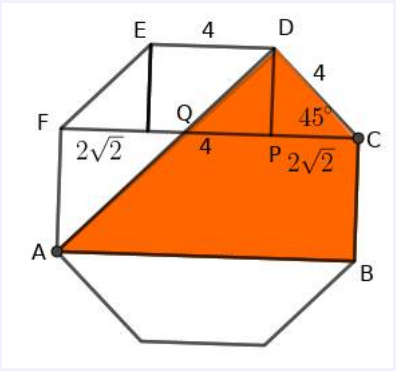
e) Area of $ADC$is $= \frac{1}{2} AC \times DE = \frac{144}{\sqrt{3}}$

f) Area of the quadrilateral is $= \frac{72}{\sqrt{3}} + \frac{144}{\sqrt{3}} = \frac{216}{\sqrt{3}}$

7) a) Angle sum n is $(n-2) \times 180$

One angle $= \frac{(8-2)\times 180}{8} = 135°$

b) Look at the picture



Draw CFperpendicular to DP .Mark Q.

$\triangle DPC$ is a $45° - 45° - 90°$ triangle.

$CD = 4$cm, $PC = 2\sqrt{2}$cm.

Length of the rectangle :$CF = 2\sqrt{2} + 4 + 2\sqrt{2}$cm

$4 + 4\sqrt{2} = 4(1 + \sqrt{2}$cm

c) Area of CDQ and area of $AFQ$are equal .

Area $= 4 \times 4(1 + \sqrt{2}) = 16(1 + \sqrt{2})$

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 19, 2021

17

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Heights and distances

1) Ramp makes an inclination 30° with the ground to the height 2 metre
   a) Draw a rough diagram
   b) What is the length of the ramp.
2) When the Sun apperas the angle of elevation 45° the length of the shadow of a tree is found to be 17 metre.
   a) Draw a rough diagram.
   b) What is the height of the tree.
3) H_1, H_2 are the heights of two towers. When obsereved the tops from a point , which is the mid way of the line joining the towers are 60° and 30°.If $H_1 > H_2$ then
   a) Draw a rough diagram.
   b) Find $H_1 : H_2$
   c) If the tall tower has height 84metre then what is the height of short tower.
   d) If the height of the toll tower is 84metre then what is the seperation between the towers .
4) when obeserved fro the top of a 50metre building the top and bottom of as tree some diatance away at the angle of depression 30° and 45°.
   a) Draw a rough diagram
   b) What is the distance from the foot of the building to the tree.
   c) Calculate the height of the tree.
5) Observing from the top of a hill two points A and B are viwed at the angle of depression 30°, 45°. If the distance from A to B is 1km
   a) Draw a rough diagarm
   b) what is the distance from the foot of the hill to the point B
   c) Calculate the height of the hill
6) A boat moves away from a light house of height 100meter observes the angle of depression 60° from the top of the light house. After2minutes the angle becomes 45°.
   a) Draw a rough diagarm
   b) what is the distance between the points of obeservation?
   c) What is the speed of the boat?

7) The top of building is observed from a point at the diatance a and b from the foot of a the building on either side .The angle of elevation are $30°, 60°$.

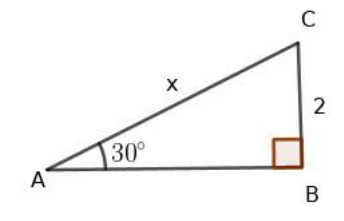
a) Draw a rough diagram.

b) If h is the height of the building , prove that $h = \sqrt{ab}$

SJ Focus Series

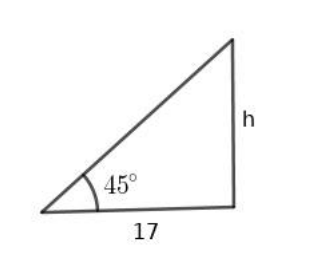
Answers

1) a) picture



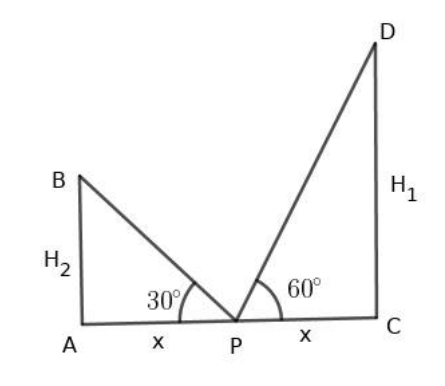
b) Triangle $ABC$is a $30° - 60° - 90°$right triangle . Side opposite to $30°$ is 2metre . $AC = 4$metre

2) a) picture



b) Triangle $ABC$is a $45° - 45° - 90°$right triangle .$AB + BC = 17$മീറ്റർ . Height of tree 17 metre

3) a) picture



b) If $AP = CP = x$ then $H_2 = \frac{x}{\sqrt{3}}, H_1 = x\sqrt{3}$

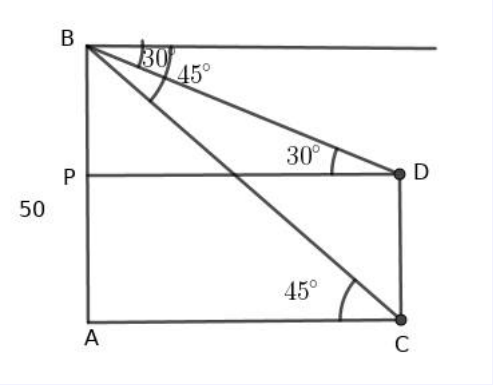
$H_1 : H_2 = \sqrt{3}x : \frac{x}{\sqrt{3}}$

$H_1 : H_2 = 3 : 1$

c) Height of small building $= \frac{84}{3} = 28$metre

d) $H_2 = 28$metre . $x = 28\sqrt{3}$metre . Distance $= 56\sqrt{3}$metre

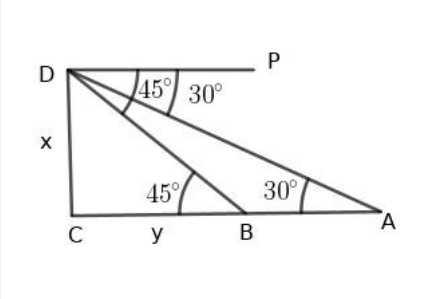
4) a) picture



b) Triangle $ABC$is a $45° - 45° - 90°$right triangle .
$AB = AC = 50$metre

c) Triangle $BPD$is a $30° - 60° - 90°$ right traingle .$BP = \frac{50}{\sqrt{3}}$
$CD = 50 - \frac{50}{\sqrt{3}}$

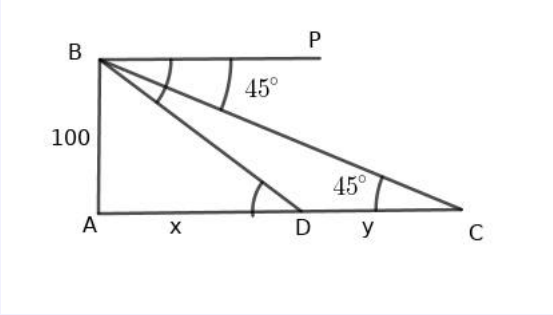
5) a) picture



b) Triangle BCD $45° - 45° - 90°$right triangle .
$x = y$
$y + 1 = \sqrt{3}y, 1 = \sqrt{3}y - y, y = \frac{1}{\sqrt{3}-1} = \frac{1}{0.73} = 1.3$km

c) $x = 1.3$km

6) a) Picture



b) $x = \frac{100}{\sqrt{3}} = 57.8$ metre
$x + y = 100, y = 100 - 57.8 = 42.2$metre

c) speed =distance /time $= 42.2 \div 2 = 21.1$ metre/ minute

7) ⋆ In $\triangle ABD$,$\tan 30° = \frac{h}{a}$

$$\frac{1}{\sqrt{3}} = \frac{h}{a} \quad (1)$$

⋆ In $\triangle ABC$,$\tan 60° = \frac{h}{b}$

$$\sqrt{3} = \frac{h}{b} \quad (2)$$

⋆ From 1 and 2

$$\frac{1}{\sqrt{3}} \times \sqrt{3} = \frac{h}{a} \times \frac{h}{b}$$

$$h^2 = ab, h = \sqrt{ab}$$

[1]

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Revision–2021 :Mathematics X

SJ Notes on Focus Area

February 20, 2021

18

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Concept of coordinate axes and coordinates of a point

■ How to locate the position of a point using coordinates

1) Draw coordinate axes and mark the points $A(1,1), B(-3,2), C(-2,-3), (3,-2)$

2) Draw coordinate axes and mark $A(-2,-2)$

   a) Write the coordinates of B which is 4 unit away parallel to y axis in the upward direction.

   b) Write the coordinates of C which is 6 unit in the right of B parallel to x axis

   c) Write the coordinates of D which is 4 unit above C on the line parallel to y axis

   d) What is the distance between A and D?

3) $A(1,1), B(-3,1), C(-3,-4), D(1,-4)$ are the oordintes of the vertices of a rectangle.

   a) What is the length of the side AB?

   b) What is the length of the side AD?

   c) Calcualte the perimetre and area of the rectangle.

4) There is a circle with centre at the origin . The circle passes through $(5,0)$

   a) What is the radius of the circle?

   b) What are the coordinates of the points where the circle cut the axes?

   c) Is $(3,4)$ a point on the circle? How can we realize it?

5) The line passing through $(0,4)$ parallel to x axis and the line passing through $(4,0)$ and parallel to y axis meet at a point.

   a) Write the coordinates of the intersecting point.

   b) What is the diatance from origin to the intersecting point.

   c) A circle is drawn with the origin as the centre and distance from origin to the intersecting point as radius. What are the points where the circle cut the axes.

6) The vertices of a right triangle are $A(1,1), B(4,1), C(1,5)$.

   a) Name the vertex at which 90° angle is taken

   b) What is the length of perpendicular sides?

   c) What is the length of its hypotenuse?

   d) What is the radius of its circumcircle?

7) $\triangle ABC$ is an equilateral triangle. Side ABcoincides $x$axi. If $A(-1,0), B(5,0)$then

a) What is the length of AB?

b) What is the altitude of the triangle?

c) What are the coodinate pairs of C?

8) Three vertices of $ABCD$are $A(0,0), B(8,0)C(8,4)$

a) Write the coordiantes of D

b) Find the perimetre of the rectangle.

c) Calculate the area of the rectangle.

9) $A(4,0), B(0,4), C(-4,0), D(0,-4)$are the vertices of a quadrilateral

a) Suggest a suitable name to $ABCD$

b) Find the length of a side?

c) Calcualte the area and perimetre

10) In triangle ABC, $A(1,2), B(7,2)$are two vertices.

a) What is the length of the side AB

b) In triangle ABC, $\angle A = 90°$.Write a pair of coordinates of C

c) What is the length of side AC?

d) Calculate the area of the triangle.

SJ Focus Series

Answers

1) Mark the points yourself

2) a) $B(-2,-2+4) = B(-2,2)$

b) $C(-2+6,2) = C(4,2)$

c) $D(4,2+4) = D(4,6)$

d) $AD = \sqrt{AP^2 + PD^2} = \sqrt{6^2+8^2} = 10$

3) a) $AB = \mid 1 - {}^{-} 3 \mid = 4$

b) $AD = \mid 1 - {}^{-} 4 \mid = 5$

c) perimetre$= 2(4+5) = 18$
area $= 4 \times 5 = 20$

4) a) 5

b) $A(5,0), B(0,5).C(-5,0), D(0,-5)$

c) Distance from origin to $(3,4)$ is $= \sqrt{3^2+4^2} = 5$, This is the radius of the circle .

5) a) $(4,4)$

b) $4\sqrt{2}$

c) $A(4\sqrt{2},0), B(0,4\sqrt{2}), C(-4\sqrt{2},0), D(0,-4\sqrt{2})$

6) a) $A(1,1)$

b) $AB = \mid 4-1 \mid = 3$, $AC = \mid 5-1 \mid = 4$

c) $BC = \sqrt{3^2+4^2} = 5$

d) Radius of the circumcircle $= \frac{5}{2} = 2.5$

7) a) $AB = | 5 - ^{-} 1 | = 6$

b) Height $= 3\sqrt{3}$

c) $C(2, 3\sqrt{3})$, $(C(2, -3\sqrt{3})$

8) a) $D(0, 4)$

b) $AB = CD = 8$, $BC = AD = 4$
ചുറ്റളവ് $= 2(8 + 4) = 24$

c) Area $= 8 \times 4 = 32$sq.unit

9) a) square

b) $4\sqrt{2}$

c) area $(4\sqrt{2})^2 = 32$ sq.cm, perimetre $= 4 \times 4\sqrt{2} = 16\sqrt{2}$

10 a) $AB = | 7 - 1 | = 6$

b) $C(1, 5)$ or $x$coordinates 1 and y can be any number

c) If $C(1, 5)$then $AC = | 5 - 2 | = 3$

d) In triaght triangle ABC , $A(1, 2), B(7, 2)$ and $C(1, 5)$
area $= \frac{1}{2} \times 6 \times 3 = 9$ sq.unit

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

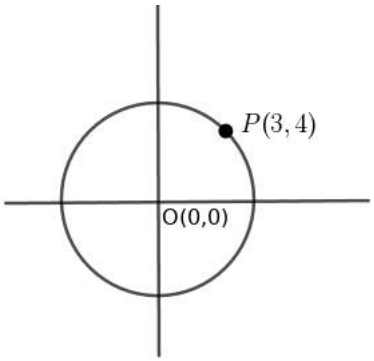
February 21, 2021

19

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

■ Rectangles squares and other geometric shapes

1) $P(3,4)$ is a point on a circle with centre at the origin



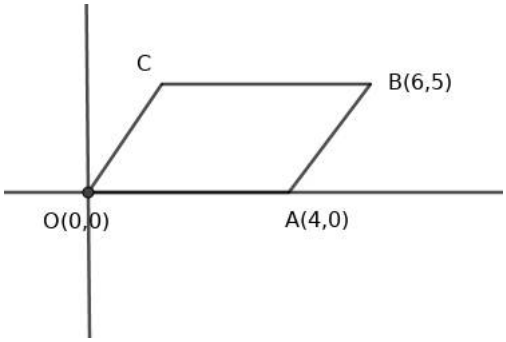
a) What is the radius of the circle?

b) $PQRS$ is a rectangle with its vertices are on this circle, sides are parallel to the axes . Write the coordinates of its vertices.

c) What are the points where the circle cut axes

d) Calculate perimetre and area of the rectangle.

2) $OABC$ is a parallelogram ,$O(0,0), A(4,0), B(6,5)$



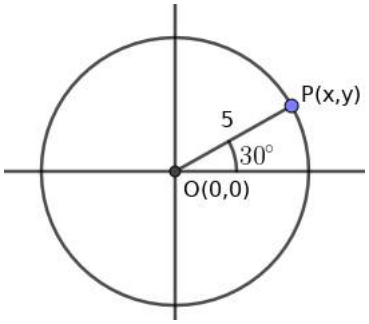
a) Write the coordinates of C

b) Write the length of OA and BC

c) What is the diatance between the parallel sides OA and BC

d) Calculate area and perimetre of the parallelogram

3) P is a point on the circle with centre at the origin and radius 5.If OP makes an angle 30° with the centre,

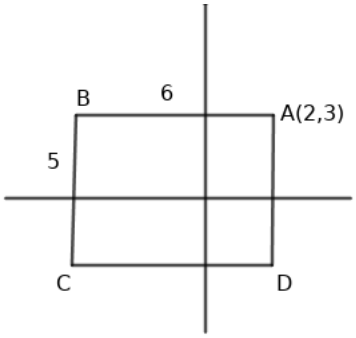


a) What are the points where the circle cut axes?

b) Write the coordinates of P

c) The vertices of the rectangle $PQRS$, with the sides parallel to the axes are on the circle.Write the coordinates of the vertices.

4) $ABCD$ is a rectangle ,sides are parallel to the axes .If $A(3,2)$, $AB = 6$, $BC = 5$then



a) Write the coordinates of B, C, D

b) Find the perimetre of the rectangle.

c) Calculate the area of the rectangle.

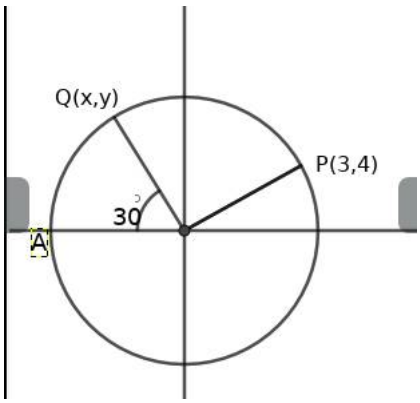
5) The perpendicular sides of the right triangle coincides the axes,right angle is at the origin . The mid point of the hypotenuse is $(6,8)$.If the sum of the perpendicular sides is 28

a) What is the radius of the circumcircle.

b) What is the length of its hypotenuse?

c) Find the area of the triangle.

6) $P(3,4)$ is a point in a circle with centre at the origin.
$Q(x,y)$ is another point on this circle ,$\angle AOQ = 30^\circ$then



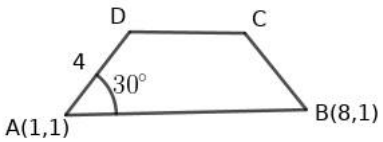
a) What is the radius of this circle?

b) What are the opoints where the circle cut the axes ?

c) Write the coordinates of Q

d) Write the coordinates of three more points on this circle.

7) $ABCD$ is an isosceles trapezium.$A(1,1), B(8,1)$, AB is parallel to CD.If $AD = 4$, $\angle A = 30°$then



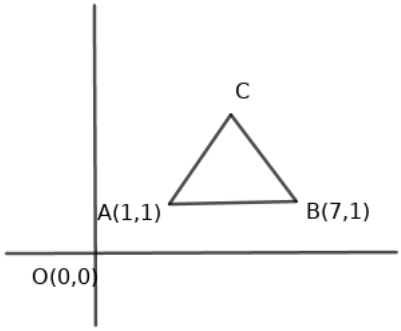
a) What is the length AB?

b) Write the coordinates of D

c) Write the coordinates of C

d) Calculate the area of the trapezium.

8) ABC is an equilateral triangle. If $A(1,1), B(7,1)$then



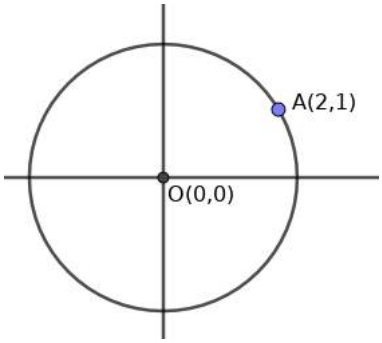
a) What is the length of one side?

b) What is the altitude of this triangle?

c) Write two pair of the coordinates of C

d) Calculate the area of the triangle.

9) $(2, 1)$ is a point on the circle with centre at the origin.

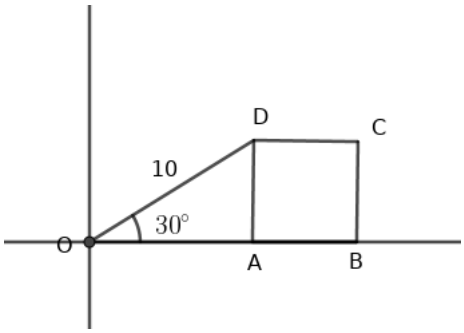


a) What is the radius of the circle?

b) What are the points where the circle cut the axes?

c) Write the coordinates of 7 more points on this circle.

10) In the figure $ABCD$ is a square. $OD = 10, \angle AOD = 30°$.



a) Write the coordinates of A

b) What is the length of one side of the square?

c) Write the coordinates of the vertices of the square.

SJ Focus Series

Answers

1) a) Radius $OP = \sqrt{3^2 + 4^2} = 5$

b) $Q(-3, 4), R(-3, -4), S(3, -4)$

c) $(5, 0), (0, 5), (-5, 0), (0, -5)$

d) Length $QR = PS = 8$, width$PQ = RS = 6$
perimetre $= 2(8 + 6) = 28$,area $= 48$

2) a) $OA = 4 \rightarrow BC = 4, C(6 - 4, 5) = C(2, 5)$

b) $OA = 4, BC = 4$

c) Distance between OA and BC is 5

d) Hypotenuse$AB = \sqrt{5^2 + 2^2} = \sqrt{29}$
perimetre$= 8 + 2\sqrt{29}$
area $= 4 \times 5 = 20$

3) a) $(5, 0), (0, 5), (-5, 0), (0, -5)$

b) Draw a line perpendicular to x axis .Let it be PN.$\triangle ONP$ is a $30° - 60° - 90°$ triangle .
side opposite to $90°$ is $= 5$.
$PN = \frac{5}{2}, ON = \frac{5}{2}\sqrt{3}$
$P(\frac{5}{2}\sqrt{3}, \frac{5}{2})$.

c) $Q(-\frac{5}{2}\sqrt{3}, \frac{5}{2}), R(-\frac{5}{2}\sqrt{3}, -\frac{5}{2}), S(\frac{5}{2}\sqrt{3}, -\frac{5}{2})$

4) a) $B(2 - 6, 3) = B(-4, 3)$
$C(-4, -2), D(2, -2)$

b) $AB = 6, BC = 5$
perimetre $= 22$

c) area $= 6 \times 5 = 30$

5) a) radius of the circumcircle $= \sqrt{6^2 + 8^2} = 10$

b) Hypotenuse $= 20$

c) $OP = PA = 10$,$\triangle POA$ is an isosceles triangle . $OM = 6, OA = 12$
similarly , $\triangle OPB$ isosceles ,$ON = 8, OB = 16$
Area $= \frac{1}{2} \times 12 \times 16 = 96$.

6) a) $OP = \sqrt{OM^2 + PM^2} = \sqrt{3^2 + 4^2} = 5$

b) $(5, 0), (0, 5), (-5, 0), (0, -5)$

c) $\triangle ONQ$ is a $30° - 60° - 90°$ triangle
$OQ = 5, \therefore QN = \frac{5}{2}, ON = \frac{5}{2}\sqrt{3}$
$Q(-\frac{5}{2}\sqrt{3}, \frac{5}{2})$

d) $(-3, 4), (-3, -4), (3, -4)$

7) a) $AB = \mid 8 - 1 \mid = 7$

b) DRaw DM perpendicular to AB
$\triangle AMD$ is a $30° - 60° - 90°$ triangle
$DP = 2, AM = 2\sqrt{3}$
$D(1 + 2\sqrt{3}, 3)$

c) Draw CN perpendicular to AB , $CN = 2, AN = 8 - 2\sqrt{3}$
$C(8 - 2\sqrt{3}, 3)$

d) Area $\frac{1}{2} \times 2 \times (7 - 4\sqrt{3} + 7) = 14 - 4\sqrt{3}$

8) a) $AB = \mid 7 - 1 \mid = 6$

b) $3\sqrt{3}$

c) $C(1 + 3, 1 + 3\sqrt{3})$

d) Area $= \frac{1}{2} \times 6 \times 3\sqrt{3} = 9\sqrt{3}$

9) a) Radius $\sqrt{1^2 + 2^2} = \sqrt{5}$

b) $(\sqrt{5}, 0), (0, \sqrt{5}), (-\sqrt{5}, 0), (0, -\sqrt{5})$

c) $(-1, 2), (-1, -2), (1, -2), (2, 1), (-2, 1), (-2, -1), (2, -1)$

10 a) $OA = 5\sqrt{3}$
$A(5\sqrt{3}, 0)$

b) $AD = 5$, Side is 5 unit

c) $A(5\sqrt{3}, 0), B(5 + 5\sqrt{3}, 0), C(5 + 5\sqrt{3}, 5), D(5\sqrt{3}, 5)$

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 22, 2021

20

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

1) Complete the following activities
   a) Draw coordinate axes and mark the points $P(x_1, y_1), Q(x_2, y_2)$
   b) Draw a line through P parallel to $x$axes, a line passing through Qparallel to $y$axis
   c) Mark the intersecting point as R
   d) Calcualte the length PR and QR
   e) Prove that $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
2) Using the diatance formula calculate the following.
   a) The distance between $P(-6, 7)$ and $Q(-1, -5$
   b) What is the distance from origin to $(-5, 12)$
   c) Find the distance between $P(-7, -3)$ and ,$Q(-5, -11)$
3) The distance between $A(2, y)$and $B(-4, 3)$ is 10unit
   a) Form an equation using the diatance formula
   b) What are the real numbers suitable for y?
   c) Write the coordinates of these points .
4) Consider the points $A(1, -1), B(5, 2), C(9, 5)$
   a) Find the distance AB ,BC and AC
   b) Prove that these points are on a line.
   c) What is the mid point of AC?
5) $P(x, y)$ is equidistant from $A(5, 1)$ and ,$B(1, 5)$
   a) What is the relation between x and y
   b) How many triangles are there with AB as the base and satisfying this condition.
   c) What is the altitude if ABP is an equilateral triangle.

6) The distance from a point P on x axis to $A(7,6)$ and $B(-3,4)$ are equal

a) What is the y coordinate of P

b) Form an equation using the distance formula.

c) Write the coordinates of P

d) Find the sides of $\triangle ABP$.

7) Consider the points $A(4,2), B(7,5), C(9,7)$

a) Find the distances AB, BC and AC

b) Can we construct $\triangle ABC$? why?

c) Write the property of these points.

8) The distance from x axis to $(7,-4)$ is $2\sqrt{5}$.

a) Take a point on x axis and form an equation.

b) How many points are there on x axis satisfying this condition.

c) What is the distance between these points.

9) Consider the points $A(0,1), B(1,4), C(4,3), D(3,0)$

a) Find the sides of $ABCD$

b) Find the length of diagonals.

c) Suggest a suitable name to this quadrilateral.

10) Consider the points $A(2,-2), B(14,10), C(11,13), D(-1,1)$

a) Find the sides of $ABCD$

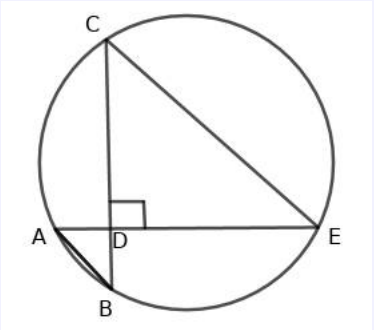
b) Find the length of the diagonals.

c) Suggest a suitable name to this quadrilateral.

SJ Focus Series

Answers

1) a),b),c) Figure



d) $PR = \mid x_2 - x_1 \mid, QR = \mid y_2 - y_1 \mid$

e) $PQ^2 = PR^2 + QR^2$, $PQ^2 = \mid x_2 - x_1 \mid^2 + \mid y_2 - y_1 \mid^2$
Note $\mid a \mid^2 = a^2$
$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

2) a) $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
$PQ = \sqrt{(6 - 1)^2 + (7 - 5)^2}$
$PQ = \sqrt{5^2 + (2)^2} = \sqrt{29}$

b) $O(0, 0), A(-5, 12)$
$OA = \sqrt{(-5 - 0)^2 + (12 - 0)^2} = \sqrt{25 + 144} = \sqrt{169} = 13$

c) $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
$PQ = \sqrt{(-5 -^- 7)^2 + (-11 -^- 3)^2} = \sqrt{2^2 + 8^2} = \sqrt{68}$

3) a) $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.
$10 = \sqrt{(-4 - 2)^2 + (3 - y)^2}$
$y^2 - 6y - 55 = 0$

b) $y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
$y = 11$ or -5

c) $A(2, 11), B(-4, 3)$
$A(2, -5), B(-4, 3)$

4) a) $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$, $AB = \sqrt{(5 - 1)^2 + (2 -^- 1)^2} = \sqrt{16 + 9} = 5$
$BC = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$, $BC = \sqrt{(9 - 5)^2 + (5 - 2)^2} = \sqrt{16 + 9} = 5$
$AC = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$, $AC = \sqrt{(9 - 1)^2 + (5 -^- 1)^2} = \sqrt{64 + 36} = 10$

b) $AB + BC = 10, AC = 10 \rightarrow AB + BC = AC$
A, B, C on a line

c) Since $AB = 5, BC = 5$, B is the mid point of AC. $B(5, 2)$

5) a) $PA = \sqrt{(x - 5)^2 + (y - 1)^2}$, $PB = \sqrt{(x - 1)^2 + (y - 5)^2}$
$PA = PB \rightarrow x^2 - 10x + 25 + y^2 - 2y + 1 = x^2 - 2x + 1 + y^2 - 10y + 25$
$8x = 8y \rightarrow x = y$

b) Infinite triangles can be drawn P is on the perpendicular bisector of AB. These are isosceles triangles.

c) $AB = \sqrt{(x_2 - y_1)^2 + (y_2 - y_1)^2}$, $AB = \sqrt{(1 - 5)^2 + (5 - 1)^2} = \sqrt{32} = 4\sqrt{2}$
ഉത്തരം $= 2\sqrt{6}$

6) a) 0

b) Diatance from $P(x,0)$ to $A(7,6)$ is $= \sqrt{(x-7)^2+(0-6)^2}$
Distance from $P(x,0)$ to $B(-3,4) = \sqrt{(x-^-3)^2+(0-4)^2}$

c) Since $PA = PB$, $\sqrt{(x-7)^2+(0-6)^2} = \sqrt{(x-^-3)^2+(0-4)^2}$
Squaring on both sides $(x-7)^2+36 = (x+3)^2+16$,
$x^2-14x+49+36 = x^2+6x+9+16$
$x = 3$, $P(3,0)$

d) $PA = \sqrt{7-3)^2+(6-0)^2} = \sqrt{4^2+6^2} = \sqrt{52}$
$PB = \sqrt{52}$, $AB = \sqrt{7-^-3)^2+(6-4)^2} = \sqrt{104}$
Since $PA^2+PB^2 = AB^2$ this is a right angled triangle.

7) a) $AB = \sqrt{(7-4)^2+(5-2)^2} = \sqrt{3^2+3^2} = \sqrt{18} = 3\sqrt{2}$
$BC = \sqrt{(9-7)^2+(7-5)^2} = \sqrt{2^2+2^2} = \sqrt{8} = 2\sqrt{2}$
$AC = \sqrt{(9-4)^2+(7-2)^2} = \sqrt{5^2+5^2} = \sqrt{50} = 5\sqrt{2}$

b) Sum of two sides is not greater than the third side.So triangle cannot be drawn.

c) Since $AB+BC = AC$ the points A, B, C are on a line.

8) a) Diatance from $P(x,0)$to $(7,-4)$ is $= 2\sqrt{5}$
$\sqrt{(x-7)^2+(0-^-4)^2} = 2\sqrt{5}$
Suaring on both sides $(x-7)^2+4^2 = 20$, $x^2-14x+49+16 = 20$,
$x^2-14x+45 = 0$

b) $x = \frac{-b\pm\sqrt{b^2-4ac}}{2a} = \frac{-^-14\pm\sqrt{(-14)^2-4\times1\times45}}{2\times1} = 9,5$
Points are $(9,0),(5,0)$

c) Distance between two points on x axis is $\mid 9-5 \mid = 4$

9) a) $AB = \sqrt{(1-0)^2+(4-1)^2} = \sqrt{10}$
$BC = \sqrt{(4-1)^2+(3-4)^2} = \sqrt{3^2+(-1)^2} = \sqrt{10}$
$CD = \sqrt{(3-4)^2+(0-3)^2} = \sqrt{(-1)^2+(-3)^2} = \sqrt{10}$
$AD = \sqrt{(0-3)^2+(1-0)^2} = \sqrt{(-3)^2+1^2} = \sqrt{10}$

b) $AC = \sqrt{(4-0)^2+(3-1)^2} = \sqrt{4^2+2^2} = \sqrt{20}$
$BD = \sqrt{(3-1)^2+(0-4)^2} = \sqrt{2^2+(-4)^2} = \sqrt{4+16} = \sqrt{20}$

c) Sides are eqial . Diagonals are equal . $ABCD$ is a square.

10 a) $AB = \sqrt{(14-2)^2+(10-^-2)^2} = \sqrt{12^2+12^2} = 12\sqrt{2}$
$BC = \sqrt{(11-14)^2+(13-10)^2} = \sqrt{(-3)^2+3^2} = 3\sqrt{2}$

$CD = \sqrt{(-1-11)^2+(1-13)^2} = \sqrt{(-12)^2+(-12)^2} = 12\sqrt{2}$

$AD = \sqrt{(2-^-1)^2+(-2-^-1)^2} = \sqrt{3^2+(-3)^2} = 3\sqrt{2}$

b) $AC = \sqrt{(11-2)^2+(13-^-2)^2} = \sqrt{9^2+15^2} = \sqrt{306}$

$BD = \sqrt{(14-^-1)^2+(10-1)^2} = \sqrt{15^2+9^2} = \sqrt{306}$

c) $AB = CD, BC = AD$ Opposite sides are equal.

Diagonals $AC = BD$ are equal . $ABCD$ is a rectangle

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Revision-2021 :Mathematics X

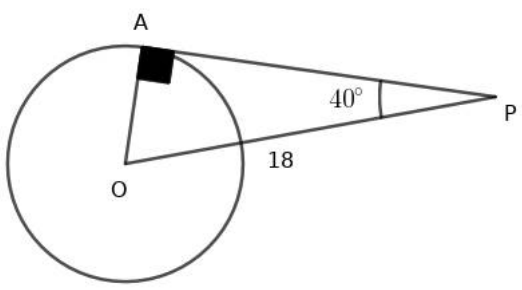
SJ Notes on Focus Area

February 23, 2021

20

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

1) Construct a tangent to a circle by the steps given below
   a) Draw a circle of radius 3cm and mark a point Pon the circle.
   b) Mark O as the centre of the circle and draw the radius OP
   c) Draw the tangent to the circle at P
   d) Draw another tangent to this circle parallel to the first tangent.
2) Draw suitable figure and find the lengths asked in the quaestion.
   a) A tangent of length 12cm is drawn to a circle from a point outside the circle.If the radius of the circle is 5cm find the distance from centre to the exterior point from which the tangent is drawn.
   b) What is the length of tangent drawn from a point at the distance 10 cm away from centre of a circle of radius 6cm
   c) A tangent is drawn from a point at the distance 26 cm away from the centre of a circle. If the length of the tangent is 24cm find the radius of the circle.
3) In the figure O is the center of the circle, $\angle OPA = 30°, OP = 16$ then
   a) Draw a rough diagram
   b) What are the angles of $\triangle OAP$
   c) What is the radius of the circle?
   d) What is the length of the tangent?
4) In the figure O is the centre of the circle. A tangent PA is drawn from P outside the circle at the diatance 12cm from the centre. If the length of the tangent and radius are equal then
   a) Draw a rough diagram
   b) What are the angles of $\triangle OAP$?
   c) What is the length of tangent and radius?
5) O is the centre of a circle.A tangent PA is drawn from the outer point P to the circle at A
   a) Draw a rough diagram .
   b) If $\angle POA = 60°$then what are the other angles of $\triangle OAP$
   c) If $\angle POA = 60°$, and the radius of the circle is 10cm find the length of tangent.
   d) What is the length of the line OP
6) In the figure $\angle OPA = 40°, OP = 18$cm then

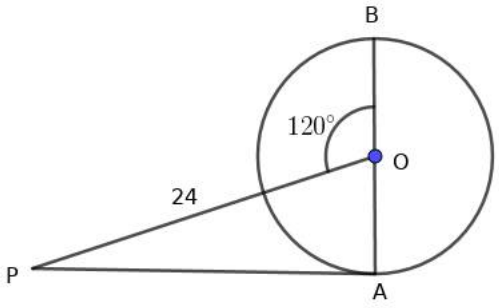


a) What is the measure of $\angle AOP$?

b) What is the radius of the circle?

c) What is the length of the tangent?
$[\sin 40 = 0.6428, \cos 40° = 0.7660, \tan 40 = 0.8391]$

7) In the figure $\angle POB = 120°$, $OP = 24$cm , $AB$is the diametre of the circle.



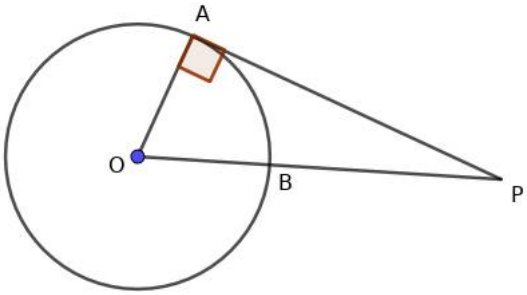
a) What are the angles of $\triangle POA$?

b) What is the diametre of the circle?

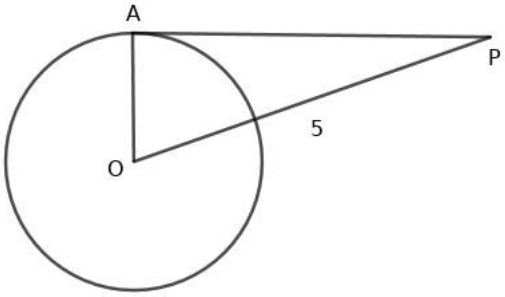
c) What is the length of the tangent from P

8) The length of tangent drawn from a point at a distance 8 cm from the centre to a circle is 4cm. Construct the tangent. Measure the radius of the circle and write aside.

9) In the figure the length of tangent PA is 12cm and $PB = 7$cm . what is the radius of the circle?



10) In the figure O is the centre of the circle and PA is a tangent. If the area of the triangle is $OPA$is 6 sq.cm and $OP = 5$cm

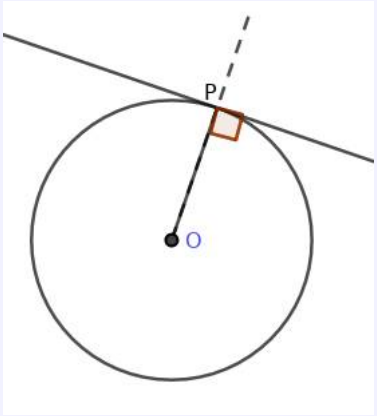


a) What is the radius of the circle?

b) What is the length of tangent?

Answers

1) Picture



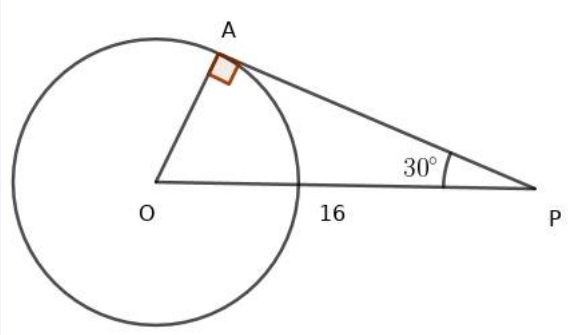
Produce radius to diametre . Draw trangents at the other end also . The tangents are parallel.

2) a) Length of tangent $= l$,radius $= r$,distance $= d$
$d^2 = l^2 + r^2$
$d^2 = 12^2 + 5^2 = 144 + 25 = 169, d = \sqrt{169} = 13$cm

b) Length of tangent $= l$,radius $= r$,distance $= d$
$d^2 = l^2 + r^2$
$10^2 = l^2 + 6^2$, $l^2 = 100 - 36 = 64, l = \sqrt{64} = 8$cm

c) Length of tangent $= l$,radius $= r$,distance $= d$
$d^2 = l^2 + r^2$
$26^2 = 24^2 + r^2, r^2 = 26^2 - 24^2 = 676 - 576 = 100, r = \sqrt{100} = 10$cm

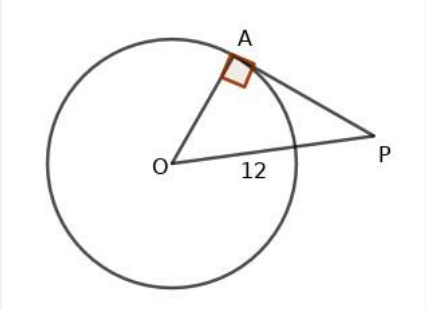
3) a) pictute



b) $\angle OPA = 30°, \angle OAP = 90°, \angle AOP = 60°$

c) This is a $30° - 60° - 90°$ triangle.
Side opposite to $90°$is 16cm . Side opposite to $30°$ is 8cm, Side opposite to $60°$ is $8\sqrt{3}$cm
Length of tangent $PA = 8\sqrt{3}$cm,radius $OA = 8$cm

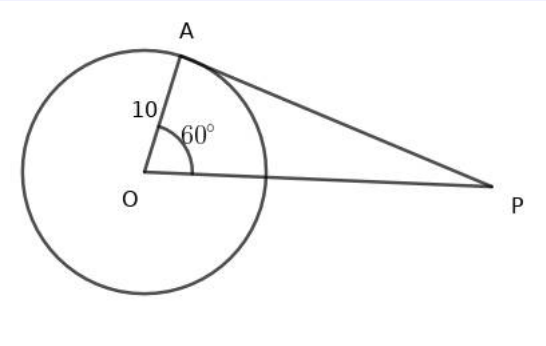
4) a) picture



b) $\angle OAP = 90°, OA = PA$. Angles opposite to equal sides are equal. Each angle is $45°$
$\triangle OAP$ is a $45° - 45° - 90°$ triangle.

c) Length of tangent $= \frac{12}{\sqrt{2}} = 6\sqrt{2}$cm, radius $= 6\sqrt{2}$cm

5) a) picture



b) angles are : $\angle OAP = 90°, \angle POA = 60° \angle OPA = 30°$

c) $\triangle OPA$ is a $30° - 60° - 90°$,angle opposite to
$30°$ is 10cm
Side opposite to $90°$ is 20cm.
Length of tangent $= 10\sqrt{3}$cm

d) $OP = 20$cm

6) a) $\angle AOP = 90 - 40 = 50°$

b) $\sin 40° = \frac{OA}{OP} = \frac{OA}{18}$
$OA = 18 \times 0.6428 = 11.57$cm

c) $\cos 40° = \frac{PA}{18}$
$PA = 0.7660 \times 18 = 13.788$cm

7) a) Triangle AOPൽ $\angle PAO = 90°, \angle POA = 180 - 120 = 60°, \angle OPA = 30°$

b) Side opposite to $90°$ is 24cm ,Side opposite to $30°$ is 12 cm
$AB = 24$cm

c) Side opposite to $60°$ is $12\sqrt{3}$cm
Length of tangent is $12\sqrt{3}$cm

8) a) Draw a line $PA$of 4cm

b) Draw a line perpendicular to PA at A

c) Draw an arc with centre at P and radius 7cm which cut the perpendicular line at O.

d) Take O as the centre of the circle and radius OA which completes the construction.

9) a) $OA = OB = r$
$OA^2 + PA^2 = OP^2$,

b) $r^2 + 12^2 = (r + 8)^2, r^2 + 144 = r^2 + 16r + 64, 80 = 16r, r = 5$ cm

10) a) $OA = r, PA = x, \frac{1}{2}rx = 6, rx = 12$
$r^2 + x^2 = 5^2$
$(r + x)^2 = r^2 + x^2 + 2rx, (r + x)^2 = 25 + 24 = 49, r + x = 7$
$(r - x)^2 = (r + x)^2 - 4rx = 49 - 48 = 1$
$r + x = 7, r - x = 1 \rightarrow 2r = 8, r = 4$

b) Length of tangent $x = \sqrt{5^2 - 4^2} = 3$

[1]

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Revision–2021 :Mathematics X

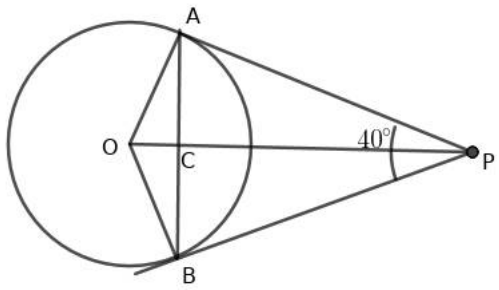
SJ Notes on Focus Area

February 24, 2021

22

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

1) In the figure PA, PB are tangents . $O$is the centre of the circle.

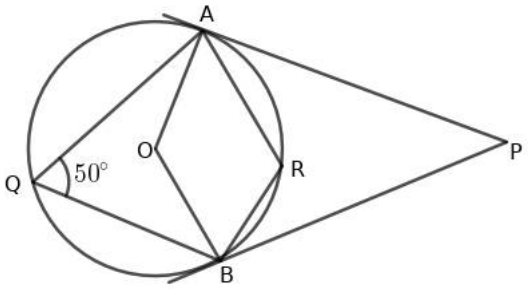


a) What are the measures of $\angle OAP, \angle OBP$?

b) If $\angle APB = 40°$ then what is the measure of$\angle AOB$

c) The lines AB and CDintersect at C .What is the relation between the length of lines CO, CP, CA and CB?

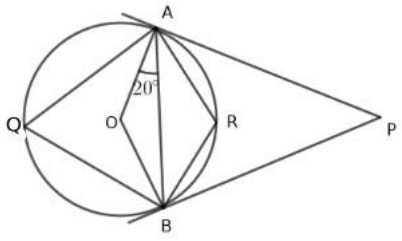
2) In the figure PA and PB are tangents $O$is the centre of the circle ,$\angle AQB = 50°$then



a) What is the measure of $\angle AOB$?

b) What is the measure of angle $\angle ARB, \angle APB$?

3) In the figure $O$is the centre of the circle, PA, PB are tangents . If $\angle OAB = 20°$then



a) What is the measure of $\angle AOB$ and , $\angle AQB$?

b) What is the measure of $\angle ARB$?

c) What is the measure of $\angle APB$?

4) Draw two tangents from an outer point of a circle of radius 3cm such that the angle between the tangents is 60°

a) What is the distance from centre to the outer point?

b) What is the length of tangents തൊടുവരയുടെ (തൊടുവരകളുടെ)നീളം എത്ര?

5) Two angles of a trinagle are $40^\circ, 60^\circ$.The sides of the triangle touches a circle of radius 3 cm

6) The sides of an equilateral triangle touches the a circle of radius 3cm .Construct the triangle.

7) In the figure PA and PB are the tangents to the circle . $\angle ACB = \frac{1}{3} \times \angle APB$

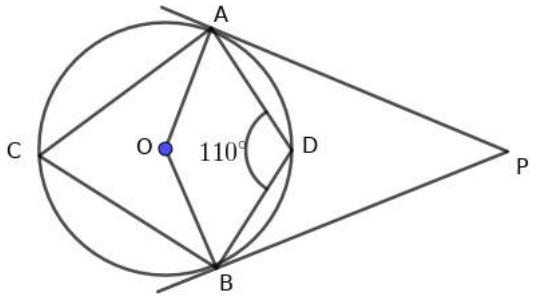
a) If $\angle APB = x$then find $\angle ACB, \angle AOB, \angle ADB$

b) Find x

c) Find the measure of $\angle ACB, \angle AOB, \angle ADB$

8) One angle of a rhombus is 60°. The sides touches a circle of diametre 5cm . Construct the rhombus.

9) In the figure O is the centre of the circle. PA and PB are the tangents. If $\angle ADB = 110^\circ$then



a) Find the measure of $\angle ACB$

b) Find the measure of $\angle AOB$

c) Find the measure of $\angle APB$

10) Two angles of a triangle are $120^\circ, 40^\circ$.The sides touches a circle of radius 3cm . Construct the triangle.

SJ Focus Series

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1) a) Tangent is perpendicular to the radius .
$\angle OAP = \angle OBP = 90^\circ$

b) $OAPB$ is a cyclic quadrilateral .$\angle AOB = 180 - 40 = 140^\circ$

c) $OAPB$ is a cyclic quadrilateral.A Circle passes through the vertices . The lines OP and AB are the chords of the circle. They intersect at C
$CO \times CP = CA \times CB$

2) a) $\angle AOB = 2 \times 50^\circ = 100^\circ$

b) $QARB$ is cyclic. $\angle ARB = 180 - 50 = 130^\circ$

c) $OAPB$is cyclic. $\angle APB = 180 - 100 = 80^\circ$

3) a) $OA = OB, \therefore \angle OBA = 20^\circ$
$\angle AOB = 180 - (20 + 20) = 140^\circ$
$\angle AQB = \frac{1}{2} \times \angle AOB = 70^\circ$

b) $AQBR$ is cyclic. $\angle ARB = 180 - 70 = 110^\circ$

c) $OAPB$ is cyclic .$\angle APB = 180 - 140 = 40^\circ$

4) ⋆ Draw a circle of radius 3cm. Draw two radii such that the angle between them is $180-60=120°$.Draw radii OA, OB

⋆ Draw tangents at A and B. They meet at P

⋆ $\angle APB = 60°$

a) Triangle OAP is a $30° - 60° - 90°$triangle. Side opposite to $30°$ 3 cm , Side opposite to $90°$ is 6 cm
The side opposite to $60°$ is $3\sqrt{3}$cm
$OP = 6$cm

b) Length of tangent is $3\sqrt{3}$cm ,$PA = PB = 3\sqrt{3}$cm

5) ⋆ Draw a circle of radius 3 cm

⋆ Since two angles are $40°, 60°$ their supplementary angles are $180-40 = 140°, 180-60 = 120°$. Draw radii such that it divide the angle around the centre as $140°, 120°, 100°$

⋆ Draw tangents to the circle at the ends of the radii.

6) ⋆ Draw a circle of radius 3cm . Mark the centre as O

⋆ Since the angles of an equilateral triangle are $60°$, divide the angle around the centre as three equal parts of $180 - 60 = 120°$

⋆ For this draw the radii OA, OB, OC

⋆ Draw tangents at A, B, C to the circle.The tangents make the triangle PQR

7) a) $\angle ACB = \frac{1}{3}x$
$\angle AOB = \frac{2}{3}x$,
$\angle ADB = 180 - \frac{1}{3}x$

b) $\frac{2}{3}x + x = 180$, $\frac{5x}{3} = 180$,$x = \frac{180\times 3}{5} = 108$

c) $\angle ACB = \frac{108}{3} = 36°$, $\angle AOB = 72°$, $\angle ADB = 180 - 36 = 144°$

8) a) Draw a line of length 5cm . Draw a circle with this line as diametre . Mark the ends of the diametre A and B

b) Draw another diametre CD such that the angle between the diametres $180 - 60 = 120°$

c) Draw tangents at A, B, C, D to the circle. This makes the rhombus.

9) a) $\angle ACB = 180 - 110 = 70°$

b) $\angle AOB = 2 \times 70 = 140°$

c) $\angle APB = 180 - 140 = 40°$

10) ⋆ Draw a circle of radius 3cm

⋆ Draw radii which divides the angle around the centre as $180-120 = 60°, 180-40 = 140°$, $160°$

⋆ Draw tangents at the ends of the diametre which makes the triangle.

[1]

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 25, 2021

23

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

1) A sectoral sheet of central angle 120° is cut off from a circular sheet of radius 12cm . It is rolled in such a way as to get a cone.
   a) What is the slant height of the cone?
   b) What is the radius of the cone ?
   c) Find the curved surface area of the cone.

2) A cone is made by rolling a semicircular metal sheet of radius 10cm
   a) What is the slant height of the cone.
   b) What is the radius of the cone.
   c) Find the curved surface area of the cone.
   d) Base is made by a suitable circular sheet. What is its total surface area ?

3) A circular sheet of card board of radius 12cm .It is cut off into two sectors of central angle 120° and 240°.Both of them are rolled into cones.
   a) Name the measure coomon to both comes
   b) What is the radius of small cone ?
   c) What is the radius of the big cone.
   d) How radii of the cones are related to the radius of the circular sheet.

4) A sector of central angle 90° is cut off from a circular sheet of radius 16cm .It is rolled in such a way as to get a cone.
   a) What is the lateral surface are of the cone?
   b) What is the radius of the cone?
   c) The remaining part of the circular sheet is also rolled to get a cone . What is its base radius?
   d) Which cone has more height ? Explain

5) A cone is made by a sectoral sheet taken from a circular sheet.The slant height of the cone is two times its radius.
   a) What is the relation between lateral surface area and base area?
   b) If the base perimetre is 20πcm then what will be its lateral surface area ?
   c) What is the central angle of this sector?
   d) The remaining part is also rolled to get a cone. What is the ratio of the heights of cones so formed

6) A cone of radius r_1 is made by using a sector of a circular sheet of radius R.The remaining part of the sheet is rolled in such a way as to get another cone of radius r_2

   a) Which measure is common in both cones?

   b) Write the relation between the radius , slant height and central angle of the sector in the case of first cone.

   c) Write the relation between the radius , slant height and central angle of the sector in the case of second cone.

   d) prove that $R = r_1 + r_2$

7) A cone is made by taking a sector from a circular sheet.The slant height of the cone is 25cm and its radius 110cm

   a) What is the radius of the circular sheet?

   b) What is the central angle of the sector?

   c) What is the central angle of the remaining part?

   d) What is the radius of the cone made by rolling the remaining part?

8) The base perimetre of a cone is 20π cm, slant height 18cm . It is rolled to get a cone.

   a) What is the radius of the sector?

   b) What is the radius of the cone?

   c) What is the central angle of the sector?

   d) Find the lateral surface area of the cone?

9) A sector of central angle 288° and radius 25cm is taken from a circulat sheet .

   a) What is the radius of the cone?

   b) What is the height of the cone ?

   c) Find the lateral surface area of the cone?

   d) What is the radius of the cone made by rolling the remaining part?

10) A cone of maximum size is carved from a square prism of base edge 10cm and height 12cm.

   a) What is the radius of the cone?

   b) What is the slant height of the cone?

   c) What is the lateral surface area of the cone?

   d) Find the total surface area of the cone?

SJ Focus Series

ഉത്തരങ്ങൾ

1) a) slant height $l = 12$cm

   b) $lx = 360r$
   $12 \times 120 = 360 \times r, r = 4$cm

   c) Lateral surface area $= \pi rl = \pi \times 4 \times 12 = 48\pi$sq.cm

2) a) slant height$l = 10$cm

   b) $lx = 360r$
   $10 \times 180 = 360 \times r, r = 5$cm

   c) Curced surface area $= \pi rl = \pi \times 5 \times 10 = 50\pi$sq.cm

   d) Total surface area =lateral surface area +Base area $= 50\pi + 25\pi = 75\pi$sq.cm

3) a) slant height $= 12$cm

b) $lx = 360r_1 \rightarrow 12 \times 120 = 360 \times r_1$
$r_1 = \frac{12 \times 120}{360} = 4$cm

c) $lx = 360r_2 \rightarrow 12 \times 240 = 360 \times r_2$
$r_2 = \frac{12 \times 240}{360} = 8$cm

d) $r_1 + r_2 = 12$.Sum of the base radii of the cones is equal to the radius of the circular plate

4) a) Area of the sector is $\frac{1}{4}$of the area of the circle.
Area of the sector $= \frac{1}{4} \times \pi \times 16^2 = 64\pi$sq.cm

b) $lx = 360r \rightarrow 16 \times 90 = 360 \times r$
$r = \frac{16 \times 90}{360} = 4$സെന്റീമീറ്റർ

c) $lx = 360r \rightarrow 16 \times 270 = 360 \times r$
$r = \frac{16 \times 270}{360} = 12$സെന്റീമീറ്റർ

d) Radius , height and slant height form a right triangle.Slant height of both pyramids are equal.It is equal to the hypotenuse of the triangle.Whenever the hypotenuse remains same , length of one perpendicular side increases according to the decrease of other side. Cone made from the sector of central angle has less height.

5) a) $l = 2r \rightarrow$ lateral surface area $= \pi rl = \pi \times r \times 2r = 2\pi r^2 = 2\times$base area

b) $2\pi r = 20\pi \rightarrow r = 10$cm
$l = 20$cm .Lareral surface area $\pi \times 10 \times 20 = 200\pi$sq.cm

c) $lx = 360r \rightarrow 2r \times x = 360 \times r$
$x = 180^\circ$

d) This is a semicircle. Remaining part is also a semicircle. Ratio of the height is $1 : 1$

6) a) Common measure is slant height.Slant height of both cones is R

b) If the central angle of the sector for first cone is x then $Rx = 360r_1$

c) The central angle of the sector for second cone is $360 - x$ and $R(360 - x) = 360r_2$

d) Adding these equations, $Rx + R(360 - x) = 360r_1 + 360r_2 \rightarrow R = r_1 + r_2$

7) a) 25cm

b) $lx = 360r \rightarrow 25 \times x = 360 \times 10, x = \frac{360 \times 10}{25} = 144^\circ$

c) Central angle of sector $= 360 - 144 = 216^\circ$

d) Radius of the cone $25 - 10 = 15$cm

8) a) 18cm

b) $2\pi r = 20\pi, r = 10$cm

c) $lx = 360r \rightarrow 18 \times x = 360 \times 10, x = \frac{360 \times 10}{18} = 200^\circ$

d) Curved surface area $\pi rl = 180\pi$sq.cm

9) a) $lx = 360r \rightarrow 288 \times 25 = 360 \times r, r = \frac{288 \times 25}{360} = 20$ cm

b) $l^2 = h^2 + r^2$, $25^2 = h^2 + 20^2 \rightarrow h^2 = 625 - 400 = 225, h = \sqrt{225} = 15$cm

c) Lateral surface area $\pi rl = \pi \times 20 \times 25 = 500\pi$ sq.cm

d) Radius of the remaining part$25 - 20 = 5$cm

10) a) 5cm

b) $h = 12$cm, $r = 5$cm
$l = \sqrt{5^2 + 12^2} = 13$ cm

c) Lateral surface area $= \pi rl = 65\pi$sq.cm

d) Total surface area =Base area + Lateral surface area
$= 25\pi + 65\pi = 90\pi$sq.cm

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Revision–2021 :Mathematics X

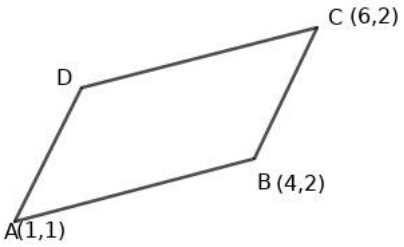
SJ Notes on Focus Area

February 26, 2021

24

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

1) $ABCD$ is a parallelogram . If $A(1,1), B(4,2), C(6,7)$then

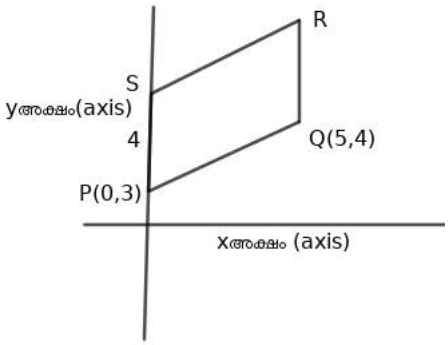


a) Write the difference between x coordinates of A and B

b) Write the difference between y coordinates of A and B

c) Write the coordinates of D.

2) In the figure $PQRS$ is a parallelogram .If $P(0,3), PS = 4, Q(5.4)$then



a) Write the coordinates of S

b) Write the coordinates of R

c) Find the length of the sides.

3) $P(1,4)$the mid point of the side AB ,$Q(2,3)$ is the mid point of side BC , $R(5,6)$is the mid point of side AC

   a) Draw a suitable diagram representing the position of points
   b) Write the coordinates of B
   c) Write the coordinates of C
   d) Write the coordinates of A

4) In triangle ABC, $A(-3,2), B(1,5), C(3,-4)$then

   a) Find the coordinates of the mid point of AB
   b) Find the coordiantes of the mid point of BC
   c) Find the coordinates of the mid point of AC

5) Draw x axis and y axis (rough diagram), mark the points $A(4,3)$ and $B(12,7)$

   a) What is the slope of this line?
   b) Write the coordinates of another point on this line?
   c) How many lines are there having the same slop?

6) Consider the points $A(2,3), B(3,4), C(4,5)$

   a) Find the slope of the line passing through $A(2,3)$ and $B(3,4)$
   b) Find the slope of the line passing through $B(3,4)$ and $C(4,5)$
   c) Are these points on a line? How can we realize it.
   d) Write the coordinates of one more point on the line?

7) Consider the points $A(2,0), B(-6,-2), C(-4,-4), D(4,-2)$

   a) Find the slope pf the lines AB and CD
   b) Find the slope of the line AD and BC
   c) Is $ABCD$ a parallelogram ?Explain

8) Consider the points $A(2,-3), B(-5,1), C(7,-1), D(0,3)$

   a) Find the slope of the line AB
   b) Find the slope of the line CD
   c) Are these points the vertices of a parallelogram ?

9) $A(1,-2), B(x,4)$ are the points on a line of slope x.

   a) Find x
   b) Write the coordinates of another point on this line
   c) Find the point at which the line cut x axis
   d) Find the point at which the line cut y axis

10) $A(-4,2), B(2,6), C(8,5), D(9,-7)$are the vertices of a quadrilateral

   a) Find the coordinates of the mid point of the sides.
   b) Prove that the quadrilateral formed by the mid points is a parallelogram
   c) Find the coordinaters of the point where the diagonals intersect.

Answers

1) a) The difference between x coordinates of A and B is $= 4 - 1 = 3$

b) The difference between y coordinates of A and C is $= 2 - 1 = 1$

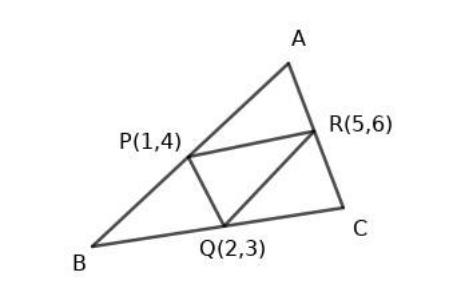
c) $D(6 - 3, 2 - 1) = D(3, 1)$

2) a) $S(0, 3 + 4) = S(0, 7)$

b) $R(5, 4 + 4) = R(5, 8)$

c) $PQ = \sqrt{(5 - 0)^2 + (4 - 3)^2} = \sqrt{25 + 1} = \sqrt{26}$
$PQ = RS = \sqrt{26}, PS = QR = 4$

3) a) Look at the picture



b) $BPRQ$is a parallelogram .The difference between x coordinates of P, R is 4
The difference between $y$coordiantes is 2
$B(2 - 4, 3 - 2) = B(-2, 1)$

c) $PRCQ$ is a parallelogram .The difference between x coordinates of P, R is 4
The difference of y coordinates of P, R is 2.
$C(2 + 4, 3 + 2) = C(6, 5)$

d) $PQRA$ is a parallelogram. The difference between x coordinates of Q, R is 3
The difference between $y$coordinates is 3
$A(1 + 3, 4 + 3) = B(4, 7)$

4) a) mid point of AB is $(\frac{-3+1}{2}, \frac{2+1}{2}) = (-1, \frac{3}{2})$

b) Mid point of BC is $(\frac{1+3}{2}, \frac{5+-4}{2}) = (2, \frac{1}{2})$

c) Mid point of AC is$(\frac{-3+3}{2}, \frac{2+-4}{2}) = (0, -1)$

5) a) Slope of the line $AB = \frac{y_2-y_1}{x_2-x_1} = \frac{7-3}{12-4} = \frac{4}{8} = \frac{1}{2}$

b) Consider $B(12, 7)$ and slope $\frac{1}{2}$another point is $C(20, 11)$. Infinite possible are possible.

c) Slope of all lines parallel to it are $\frac{1}{2}$.

6) a) Slope of AB is $= \frac{4-3}{3-2} = 1$

b) Slope of BC is $= \frac{5-4}{4-3} = 1$

c) Slope of AB and slope of BC are equal. $B$is the common point . So A, B, C are on a line.

d) Find the linear relation between the coordinates of points. Using this relation we can write points .

7) a) Slope of AB is $\frac{-2-0}{-6-2} = \frac{-2}{-8} = \frac{1}{4}$
Slope of CD is $= \frac{-2-^-4}{4-^-4} = \frac{2}{8} = \frac{1}{4}$
AB is parallel to CD

b) Slope of AD is $= \frac{-2-0}{4-2} = \frac{-2}{2} = -1$
Slope of BC is $\frac{-4-^-2}{-4-^-6} = \frac{-2}{2} = -1$
AD is parallel to BC

c) Since opposite sides are parallel $ABCD$ is a parallelogram.

8) a) Slope of $AB = \frac{y_-2-y_1}{x_2-x_1} = \frac{1-^-3}{-5-2} = \frac{4}{-7} = -\frac{4}{7}$

b) Slope of $CD = \frac{3-^-1}{0-7} = -\frac{4}{7}$

c) Slope of AB and slope of CD are equal .
Slope of $AD = \frac{3-^-3}{0-2} = -3$
slope of $BC = \frac{-1-1}{7-^--5} = \frac{-2}{12} = -\frac{1}{6}$
Side AD is not parallel to BC.Opposite sides are not parallel. $ABCD$ is not a parallelogram.

9) a) Slope :$\frac{y_2-y_1}{x_2-x_1} = 3$, $\frac{4-^-2}{x-1} = 3$, $\frac{6}{x-1} = 3, 3x-3 = 6, 3x = 9, x = 3$, $B(3,4)$

b) Since 3is the slope another point is $C(3+1, 4+3) \rightarrow C(4,7)$

c) $y$coordinate of the point on x axis is 0 The point is $P(x,0)$ Consider $A(1,-2)$,and $(x,0)$
$\frac{-2-0}{1-x} = 3, x = \frac{5}{3}, P(\frac{5}{3},0)$

d) x coordinate of the point on y axis is 0. Point is $Q(0,y)$.$\frac{y-^-2}{0-1} = 3, y = -5$ $Q(0,-5)$

10) a) Mid point of AB is $P(\frac{-4+2}{2}, \frac{2+6}{2}) \rightarrow P(-1,4)$
Mid point of BC is $Q(\frac{2+8}{2}, \frac{6+5}{2}) \rightarrow Q(5, \frac{11}{2})$
Mid point of CD is $R(\frac{8+9}{2}, \frac{5+-7}{2}) \rightarrow R(\frac{17}{2}, -1)$
Mid point of AD is $S(\frac{-4+9}{2}, \frac{2+-7}{2}) \rightarrow S(\frac{5}{2}, -\frac{5}{2})$

b) Find slope of PQ and RS. These are found to be equal. Both are $\frac{1}{4}$. PQ is parallel to RS.
Slopes of PS and $QR$are equal . Slopes are equal. It is a parallelogram

c) Try yourself

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Revision-2021 :Mathematics X

SJ Notes on Focus Area

February 27, 2021

25

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

1) The sides of a rectangle are $(x-3)$ and $(x+1)$
   a) Find the area $a(x)$
   b) If $x=4$then what is its area ?
   c) If $x=0$ is it possible to get a rectangle ? Why?
   d) What is the condition for x to get a rectangle?
2) Consider the polynomial $p(x)=x^3-4x^2+2x+k$
   a) If x is a factor then find x.
   b) $x-1$ is a first degree factor of $p(x)$then what is k?
   c) Use k for becoming $x-1$ a factor and write the polynomial
   d) Is $(x+1$ a factor of this polynomial .
3) If $p(x)=x^3-4x^2+6x-k$then
   a) Find k such that $x-1$ a factor of $p(x)$
   b) Write the polynomial . Is $(x+1)$ a factor of $p(x)$
   c) What is the speciality of the coefficients of $p(x)$ having $x-1$ a factor
   d) Write three polynomials having $x-1$ a factor
4) Consider the polynomials $p(x)=x^3+1$, $q(x)=x^3+x^2+x+1$
   a) Find $p(-1)$ and $q(-1)$
   b) What is the factor common to both the polynomials
   c) Find $r(x)=p(x)+q(x)$
   d) what is the first degree factor of $r(x)$
5) x^2-1 is the factor of $p(x)=a^3+bx^2+cx+d$
   a) Find $p(1), p(-1)$
   b) Show that $a=-c, b=-d$
   c) Write a polynomial having x^2-1 a factor
6) If $p(x)=x^3-8$ then
   a) Check whether $x-2$ a factor of $p(x)$
   b) Write a first degree factor of x^3-27
   c) What is the second degree factor of x^3-27
7) Consider the polynomial $p(x)=3x^2+4x+1$
   a) Write $p(x)$as the product of two first degree factors
   b) Find the solution of the equation $p(x)=0$

8) Consider the equation $p(x) = x^3 + 4x^2 + x - 7$

a) Check whether$x - 1$ a factor of this polynomial or not

b) If not what should be subtracted from $p(x)$ to get another polynomial $q(x)$ in which $x - 1$ is a factor

c) Write $q(x)$ as the product of three first degree factors

d) Write the solution of the equation $q(x) = 0$.

9) Consider the polynomial $p(x) = ax^2 - 2bx + c$

a) If $x - 1$ is a factor of $p(x)$ prove that a, b, c are in an arithmetic sequence.

b) Write twp polynomials in the form $ax^2 - 2bx + c$ such that a, b, c are in an arithmetic sequence .

c) If $x^2 - 1$ is a factor of $p(x)$ then what is $a + b$?

SJ Focus Series

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1) a) $a(x) = (x-3)(x+1) = x(x+1) - 3(x+1) = x^2 - 2x - 3$

b) If $x = 4$ then $a(4) = 4^2 - 2 \times 4 - 3 = 16 - 8 - 3 = 5$

c) If $x = 0$ the side becomes a negative number.So it cannot make a square.

d) $x > 3$.

2) a) $k = 0$

b) If $x - 1 = 0$ then $p(1) = 0$
$1^3 - 4 \times 1^2 + 2 \times 1 + k = 0, k = 1$

c) $p(x) = x^3 - 4x^2 + 2x + 1$

d) $p(-1) = (-1)^3 - 4(-1)^2 + 2(-1) + 1 = -1 - 4 - 2 + 1 \neq 0$
$x + 1$is not a factor

3) a) If $(x - 1)$a factor $p(1) = 0$.
$1^3 - 4 \times 1^2 + 6 \times 1 - k = 0, 1 - 4 + 6 - k = 0, k = 3$

b) $p(x) = x^3 - 4x^2 + 6x - 3$
$p(-1) = (-1)^3 - 4 \times (-1)^2 + 6 \times (-1) - 3 = -1 - 4 - 6 - 3 = -14 \neq 0$
$p(-1) \neq 0$. $(x + 1)$ is not a factor

c) sum of the coefficients is zero.$(x - 1)$ is a factor

d) $x^3 - x^2 + x - 1$,$2x^3 - 4x^2 + 5x - 3$, $x^3 - 4x^2 + 2x + 1$

4) a) $p(-1) = (-1)^3 + 1 = -1 + 1 = 0$
$q(-1) = (-1)^3 + (-1)^2 + (-1) + 1 = -1 + 1 - 1 + 1 = 0$

b) $p(-1) = 0, q(-1) = 0$, $(x - 1)$ is a factor .$(x - 1)$ is a factor

c) $r(x) = (x^3 + 1) + (x^3 + x^2 + x + 1) = 2x^3 + x^2 + x + 2$

d) $r(-1) = 2(-1)^3 + (-1)^2 + (-1) + 2 = -2 + 1 - 1 + 2 = 0$
$x + 1$ is the factor of $r(x)$

5) a) $x^2 - 1 = (x-1)(x+1)$
$(x - 1), (x + 1)$ are the factors of $p(x)$
$p(-1) = 0, p(1) = 0$

b) $p(1) = 0 \to a + b + c + d = 0$
$p(-1) = 0 \to a - b + c - d = 0, a + c = b + d$
$a + b + c + d = 0 \to 2(a + c) = 0, a + c = 0, a = -c, b = -d$

c) $a = -c, b = -d$, Example $3x^3 - 4x^2 - 3x + 4$

6) a) $p(2) = 2^3 - 8 = 8 - 8 = 0$
$x - 2$ is a factor of $p(x)$

b) $q(x) = x^3 - 27$, $q(3) = 3^3 - 27 = 27 - 27 = 0$
$x - 3$ is a factor of $x^3 - 27$

c) $x^3 - 27 = x^3 - 3^3 = (x-3)(ax^2+bx+c)$.
ax^2+bx+c is the second degree factor .

$x^3 - 27 = (x-3)(ax^2+bx+c$
$x(ax^2+bx+c) - 3(ax^2+bx+c) = ax^3+bx^2+cx-3ax^2-3bx-3c = ax^3+(b-3a)x^2+(c-3b)x-3c$
Equating the coefficients $a=1, (b-3a)=0, (c-3b=0), -27=-3c, c=9$
$c-3b=0 \to 9-3b=0, b=3,$
Second degree factor is x^3+3x+9

7) a) $p(x) = 3x^2+4x+1 = k(x-a)(x-b) = k(x^2-(a+b)x+ab) = kx^2-k(a+b)x+kab$
$k=3, a+b=-\frac{4}{3}, ab=\frac{1}{3}$
$(a-b)^2 = (a+b)^2-4ab \to (\frac{-4}{3})^2 - 4\frac{1}{3} = \frac{4}{9}$
$a-b=\frac{2}{3}$
$a-b=\frac{2}{3}, a+b=\frac{-4}{3} \to a=\frac{-1}{3}, b=-1$
$p(x) = k(x-a)(x-b) \to 3(x-\frac{-1}{3})(x-^-1) = 3(\frac{3x+1}{3})(x+1) = (x+1)(3x+1)$

b) $x+1=0 \to x=-1, 3x+1=0 \to x=\frac{-1}{3}$

8) a) $p(1) = 1^3+4\times1^2+1-7 = 6-7 = -1 \neq 0$
$x-1$ is not a factor

b) $p(1)=-1$ .On subtracting -1 from $p(x)$ we get a polynomial with $x-1$ is a factor
$q(x) = x^3+4x^2+x-6$

c) $x^3+4x^2+x-6 = (x-1)(ax^2+bx+c)$.
Equating the constant terms $-6=-c, c=6$
Equating the coefficeients of x ,$1=c-b \to 1=6-b, b=5$
Equating the coefficeients of x^2 ,$-a+b=4, -a+5=4, a=1$
$ax^2+bx+c = x^2+5x+6 = (x+2)(x+3)$
$q(x) = (x+1)(x+2)(x+3)$

d) $q(x) : (x+1)(x+2)(x+3)=0, x=-1,-2,-3$are the solutions

9) a) $x-1$ is a factor $p(1)=0$.
$a\times1^2-2b\times1+c=0, a-2b+c=0$
$a+c=2b, a+c=b+b \to b-a=c-b \to a,b,c$are in arithmetic sequence .

b) $a=4, b=3, c=2$ then $4x^2-6x+2$.

c) $x^2-1=(x-1)(x+1), x-1, x+1$ are the factors .$p(1)=0 \to a-2b+c=0$
$p(-1)=0 \to a+2b+c=0$
Adding these equations $2a+2c=0, a+c=0$

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Revision–2021 :Mathematics X

SJ Notes on Focus Area

February 28, 2021

26

(This is a simplified special package based on focus area mathematics X in the year 2021 SSLC Examination)

1) Atmospheric tempereature of seven days in a week are given below .

$$26^\circ C, 28^\circ C, 25^\circ C, 30^\circ C, 27^\circ C, 26^\circ C, 25^\circ C$$

   a) Write the numbers in the ascending order.
   b) Calculate the mean of the temperatures.
   c) What is the median temperature?
   d) How many days are having temperature less than median temperature?
   e) How many temperatures are there below median temperature?

2) Consider th counting numbers from 1 to 100.

   a) How many multiples of $7$are there below 100?
   b) Calculate the mean of the multiples of 7 below 100.
   c) What is the median of the multiples of 7 belw 100?
   d) How many multiples are there more are median in this collection ?

3) The marks obtained in ten class tests are given below

$$14, 17, 11, 19, 15, 17, 13, 10, 14, 18$$

   a) Calculate the mean of the marks .
   b) What are the marks comes in the middle if the marks are arranged in the increasing order?
   c) What is the median mark ?
   d) How many class tests are there scoring mark above median mark?

4) Consider the arithmetic sequence $7, 10, 13 \cdots$

   a) How many terms are there below 100?
   b) Which term comes in the middle?
   c) Calculate the mean of the numbers in the sequence below 100
   d) CXalculate the median of numbers in the sequence below100
   e) What is the relation between mean and median?

5) The algebraic form of an arithmetic sequence is $3n + 2$

a) Write the sequence

b) Calculate the mean of first 20 terms.

c) Calculate the median of the first 20 numbers of this sequence number of this sequence .

d) What is the relation between mean and median.

6) Consider a group of numbers in an arithmetic sequence

a) What is the general form of its algebra ?

b) Calculate the mean of these numbers

c) Find the median .

d) Are mean and median equal?Write a statement about the result.

7) The scores of 40 students in a quiz are given below

Score	4	6	9	10	15
Number of Children	5	10	10	7	8

a) Calculate the total score in the class

b) Calculate mean score

c) Find the median of the scores

d) How many students are there above median score ?

8) The weights of 12 members of a team are given below

Weight	67	70	72	73	75
Number of members	4	3	2	2	1

a) Prepare a table for calculating the median

b) What is the median of the weights ?

c) How many members are having medsian weight and below?

d) How many members are there above median weight?

9) The daily wages of 200 workers in a factory are given below .

Wages	350	400	450	500	550	600
No. Workers	14	50	30	40	36	30

a) Prepare the table for calculating the median.

b) Find the median wage.

c) How many workers are getting median wage and below ?

d) How many workers are getting median wage and above ?

10) Answer the following questions.

a) Find the mean of 100 odd numbers .

b) Find the median of first 100odd numbers

c) What is the mean of first n even numbers ?

d) What is the median of first n even numbers ?

SJ Focus Series

Answers

1) a) $25°C, 25°C, 26°C, 26°C, 27°C, 28°C, 30°C$

b) median $= \frac{26+28+25+30+27+26+25}{7} = 26.71$

c) Number comes in the middle of the ascending order is 26. Median temperature $= 26°C$

d) There are 3 days above median temperature $26°C$. There are 2 days below median temperature

e) Only one teperature below median.

2) a) $7, 14, 21 \cdots 98$ are numbers . $7n = 98 \rightarrow n = \frac{98}{7} = 14$.
There are 14 numbers .

b) Sum $7 + 14 + 21 \cdots + 98 = (7 + 98) \times \frac{14}{2} = 105 \times 7 = 735$
Mean $= \frac{735}{14} = 52.5$

c) 7 th and 8 th comes in the middle . $x_7 = 7 \times 7 = 49, x_8 = 7 \times 8 = 56$. Median $= \frac{49+56}{2} = 52.5$

d) $x_8, x_9, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}$are above 52.5. There are 7numbers above median

3) a) Mean $= \frac{14+17+11+19+15+17+13+10+14+18}{10} = 14.8$

b) Marks in the ascending order $10, 11, 13, 14, 14, 15, 17, 17, 18, 19$
$n = 10$ (even numbers). 5th and 6comes in the middle. These are $14, 15$.

c) Median $= \frac{14+15}{2} = 14.5$

d) 5

4) a) $x_n = 3n + 4$. $3n + 4 < 100 \rightarrow 3n < 96, n < 32$.There are 31 numbers below 100

b) 31 is an odd number. $\frac{31+1}{2} = 16$th comes in the middle . $x_{16} = 3 \times 16 + 4 = 52$

c) $x_{31} = 3 \times 31 + 4 = 97$. Sum $= (7 + 97) \times \frac{31}{2} = \frac{104 \times 31}{2} = 1612$
mean $= \frac{1612}{31} = 52$

d) 16 th term is median .$x_{16} = 3 \times 16 + 4 = 52$

e) Mean and median are equal

5) a) Sequence $5, 8, 11 \cdots$

b) $x_{20} = 3 \times 20 + 2 = 62$
Sum of 20terms $= (5 + 62) \times \frac{20}{2} = 670$
median $= \frac{670}{20} = 33.5$

c) Tenth and eleventh comes in the middle $x_{10} = 32, x_{11} = 35$
median $= \frac{32+35}{2} = 33.5$

d) Mean and median are equal

6) a) Total score $= 4 \times 5 + 6 \times 10 + 9 \times 10 + 10 \times 7 + 15 \times 8 = 20 + 60 + 90 + 70 + 120 = 360$

b) median $= \frac{360}{40} = 9$

c) Table

Scores	Number of students
upto 4	5
upto 6	15
upto 9	25
upto 10	32
upto 15	40

Number of children 40.20 th and 21comes in the middle . median 9

d) 15.

7) a) Table

Weight	No
upto 67	4
upto 70	7
upto 72	9
upto 73	11
upto 75	12

b) $n = 12$(even number). Sixth and seventh comes in the middle
median 70

c) 4.

d) 5

8) a) Table

wages	Number
350	14
400	64
450	94
500	134
550	170
600	200

b) $n = 200$(Even number). 100 th and 101st comes in the middle . median 500

c) 94

d) 66

9) a) Median $= \frac{100^2}{100} = 100$

b) $1, 3, 5, 7 \cdots$ is the sequence of odd numbers . $x_n = 2n - 1$.
50th and 51st comes in the middle .These are $2 \times 50 - 1, 2 \times 51 - 1$
Median $= \frac{99+101}{2} = 100$

c) Median $= \frac{n(n+1)}{n} = n + 1$

d) $2, 4, 6, 8 \cdots$, $x_n = 2n$
$\frac{n}{2}, (\frac{n}{2} + 1)$ comes in the middle .These are n and $n + 2$. Median $\frac{n+n+2}{2} = n + 1$

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