SAMAGRA PLUS

FIRST TERM SAMPLE PRACTICE PAPER

MATHEMATICS IX

Time : 2 hours and 30 minutes Score : 80

◆ Answer any 3 questions. Each carries 2 scores.

1) Total cost of a pen and two pencils is 17 rupees. Total cost of a pen and a pencil is 13 rupees.

a) What is the cost of a pencil?

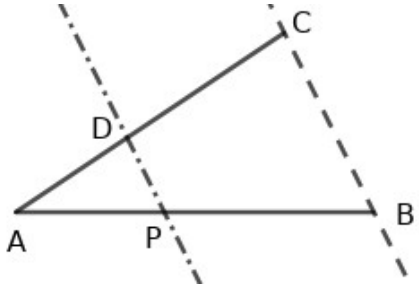
b) What is the cost of a pen?

2) Perimeter of a square is 4 cementer.

a) What is the length of its side?

b) What is the length of its diagonal?

3) In the figure P divides AB in the ratio $1{:}2$. The lines BC and PD are parallel lines.



a) What is $AD : CD$?

b) If $AD = 5$ centimetre, then what is AC ?

4) The integers x and y are related as $x + y = 12$ and $xy = 11$.

a) Write the expansion of $(x + 1)(y + 1)$.

b) Find $(x + 1)(y + 1)$?

◆ Answer any 4 questions. Each carries 3 scores

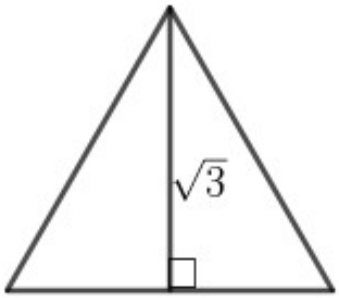
5) Three equations are given below.

$x + y = 7, \quad y + z = 4, \quad x + z = 3$

a) What is $x + y + z$?

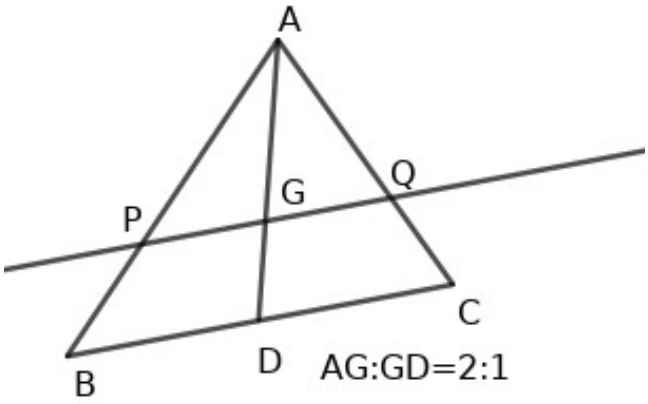
b) Find x, y and z.

6) The perpendicular distance from a vertex to the opposite side of an equilateral triangle is $\sqrt{3}$ centimetre.



a) What is the length of its side?
b) Find the area of this triangle.

7) A point G divides the median of a triangle in the ratio $2{:}1$ as in the figure. The line PQ is parallel to BC.



a) Write the special name of G in a triangle.
b) What is $AP : PB$?
c) If $AC = 21$ centimetre then what is the length AQ?

8) a) Write the expansion of $(x + y)(u + v)$.
b) Using this write $(x + 3)(y + 4)$ as the sum of four terms.

9) x and y are the small angles of a right triangle.
a) What is $x + y$?
b) If $x - y = 10$ then find the small angles of the triangle?

10) Draw the equilateral triangle of perimeter 11 centimetre.

11) Let's see the patterns given below,

$$\frac{1}{9} = 0.111\cdots$$

$$\frac{2}{9} = 0.222\cdots$$

$$\frac{3}{9} = 0.333\cdots$$

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a) Write the next line.

b) Write $0.444\cdots$ as a fraction.

c) Write the decimal form of $\sqrt{0.444\cdots}$.

◆ Answer any 8 questions. Each carries 4 scores.

12) x five rupee coins and y ten rupee coins costs 80 rupees.
x ten rupee coins and y five rupee coins costs 70 rupees.

a) Write the equations.

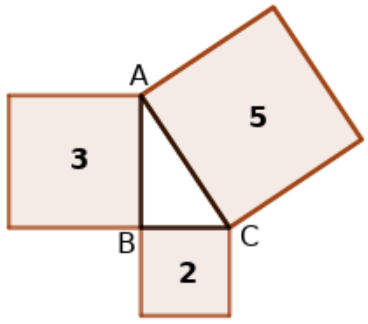
b) Find the number of coins of each denomination?

13) Sum of two odd numbers is 24 and the product is 143. If x and y are the numbers then,

a) Expand $(x+2)(y+2)$.

b) Calculate $(x+2)(y+2)$.

14) Three squares with areas of 2 cm^2, 3 cm^2 and 5 cm^2 are joined to form a triangle, as shown in the figure.

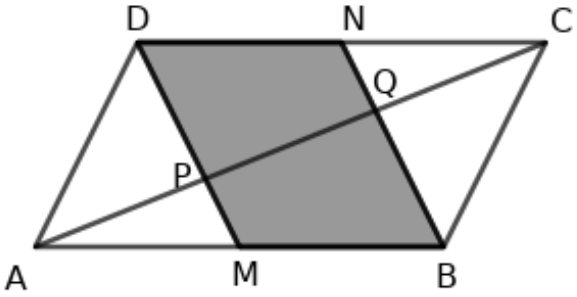


$(\sqrt{2} = 1.41, \sqrt{3} = 1.73, \sqrt{5} = 2.23)$

a) What are the length of its sides ?

b) Calculate the approximate perimeter of the triangle?

15) In the figure $ABCD$ is a parallelogram. Mid point of AB is M and Mid point of CD is N.



a) Is the shaded part a parallelogram? Why?

b) Prove that $AP = PQ = QC$.

c) If $PQ = 4$ centimetre, find AC ?

16) a, b, c, d are consecutive natural numbers.

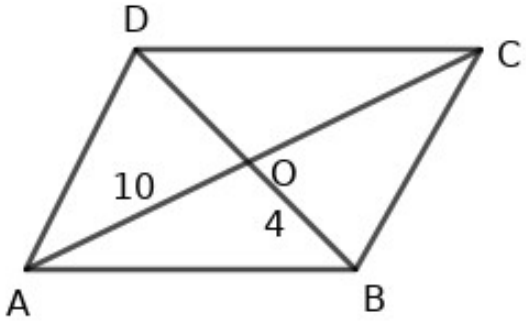
a) If $a = x$ then express b, c and d in terms of x.

b) Find the difference between bc and ad.

c) If $bc = 72$ then find $ad - 2$.

17) $ABCD$ is a parallelogram. The diagonals intersect at O.

$OD = x + y, \quad OC = x + 3y$

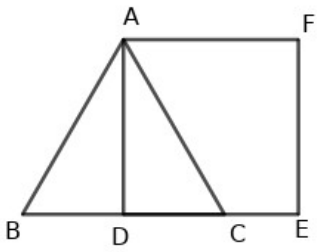


a) Write the equations.

b) Calculate x and y.

c) Calculate the length of diagonals.

18) A square is drawn on the altitude of an equilateral triangle. Perimeter of the triangle is 6centimeter.



a) What are the lengths of the sides of the triangle?
b) What is the area of square?
c) Find the altitude of the triangle.

19) Draw an isosceles triangle with a perimeter of 13 centimeters, where the length of each equal side is $1\frac{1}{2}$ the length of the shorter side.

20) Let's see the pattern given below.

$1^2 - 0^2 = 1$

$2^2 - 1^2 = 3$

$3^2 - 2^2 = 5$

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a) Write 11 as the difference of two perfect squares.
b) If $N = a^2 - b^2$, N is an odd number and a, b are consecutive natural numbers, then what is $a + b$?
c) p and q are natural numbers , $17 = p^2 - q^2$ then what is $p - q$?

21) The sum of the digits of a two-digit number is 7. When the digits are reversed, the new two-digit number obtained is 27 more than the original number.
a) If x and y are the digits then write the equation.
b) Find the number by solving the equations.

22) The product of two natural numbers 70 and their sum is 17.
a) If x and y are numbers $(x > y)$. Expand $(x - 1)(y - 1)$.
b) Calculate $(x - 1)(y - 1)$.

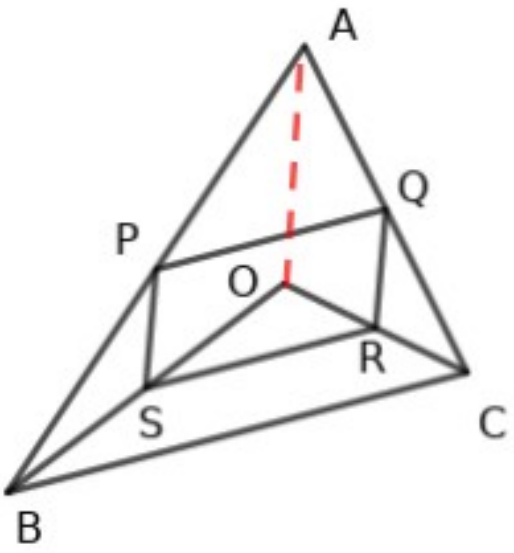
◆ Answer any 6 questions. Each carries 5 scores

23) An object is moving along a straight line. It starts with an initial speed of $u\ m/s$, and its speed increases at a rate of $a\ m/s^2$. Using the data given below, calculate the initial speed u and the rate of increase of speed a.

- If the speed v after t seconds is related as $v = u + at$
- Speed $v = 24\ m/s$ at $t=6$ seconds
- Speed $v = 36m/s$ at $t=10$ seconds

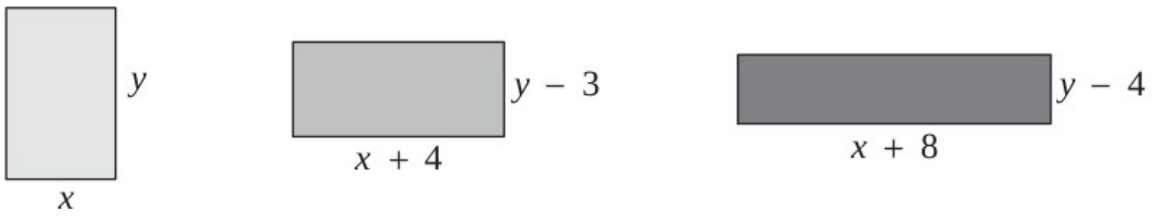
a) Write the equation using the given data.
b) Find u and a.
c) What will be the speed after 12 seconds?

24) In triangle ABC, P is the midpoint of AB and Q is the midpoint of AC. In triangle BOC, R is the midpoint of OC and S is the midpoint of OB.



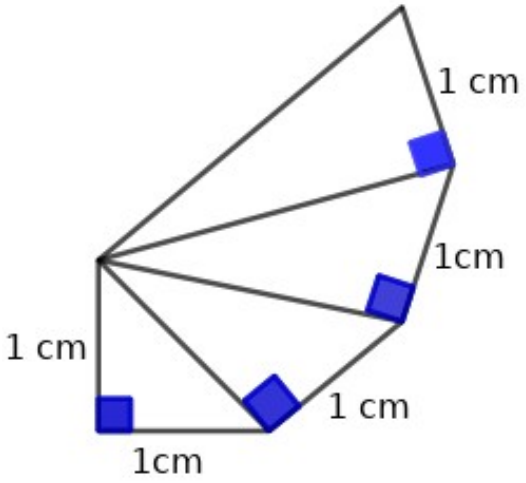
a) If $BC = 12$ centimetre find PQ ?
b) If $BC = 12$ centimetre find SR?
c) If $OA = 8$, what are the values of PS and QR?
d) Suggest a suitable name for $PQRS$.

25) The rectangles in the figure have equal areas.



a) Form the equations.
b) Find x and y ?
c) Write the sides of the rectangle in the middle.

26) Right triangles are drawn as shown in the figure.



If counting the right triangles from the bottom,...
a) What is the hypotenuse of first right triangle?
b) What are the sides of second right triangle?
c) What is the perpendicular sides of 10^{th} right triangle?
d) What will be the area of square drawn on the hypotenuse of 10^{th} right triangle.

27) Draw a regular hexagon with a perimeter of 20 centimetre.
(Hint : Draw a line 10 cm long and divide it into three equal parts. Draw a circle with one of these segments as the radius. Then, draw the regular hexagon with vertices on this circle.)

28) The diagonals of a square are perpendicular bisectors . It divide the square into four equal right triangles. In the figure, a right triangle is removed from a square of side $\sqrt{2}$ metre.

a) What is the hypotenuse of the removed right triangle ?

b) What is the length of the diagonal of the square?

c) Find the perimeter of the shape in the figure.

29) $4n,\ 4n^2-1$ and $4n^2+1$ forms a Pythagorean triplets for $\mathrm{n}=1,2,3\cdots$.

a) Write the triples for $\mathrm{n}=1$.

b) If the hypotenuse of a right triangle is 17, what is the length of its smallest side?

c) If the middle number in the triplets is 399, then what is the largest number in the triplets ?

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ANSWER KEY

Time : 2 hours and 30 minutes Score : 80

1) a) The number of pencils in the first case is one more than in the second case.
Therefore one pencil costs 17 – 13 = 4 Rupees.
b) Cost of a pen = 3 Rupees.

2) a) 1 centimetre
b) $\sqrt{2}$ centimetre

3) a) $1:2$
b) 15 centimetre

4) a) $(x+1)(y+1) = xy + x + y + 1.$
b) $(x+1)(y+1) = 11 + 12 + 1 = 24$

5) a) $x + y + y + z + x + z = 7 + 4 + 3$
$2(x + y + z) = 14$
$x + y + z = 7$

b) $x + y + z = 7$ $\quad$ $y + z = 4$ $\quad$ $x + z = 3$
$7 + z = 7$ $\quad$ $y + 0 = 4$ $\quad$ $x + 0 = 3$
$z = 0$ $\quad$ $y = 4$ $\quad$ $x = 3$

6) a) 2 centimetre
b) $\sqrt{3}$ square centimetres

7) a) Centroid of the triangle
b) $2:1$
c) Since $AP : PB = 2 : 1$ then $AQ : QC = 2 : 1$
Given that $AC = 21$ centimetre, therefore $AQ = 14$ centimetre

8) a) $(x + y)(u + v) = xu + xv + yu + yv$
b) $(x + 3)(y + 4) = xy + 4x + 3y + 12$

9) a) $x + y = 90^0$

b) $x + y = 90$ and $x - y = 10$, on solving $x = 50^0$ and $y = 40^0$

10) ⋆Draw a line of length 11 centimetre.

⋆ Divide it into three equal parts using the property of parallel lines.

⋆ Complete the equilateral triangle.

11) a) $0.444\cdots$

b) $0.444\cdots = \frac{4}{9}$

c) $\sqrt{0.444\cdots} = \sqrt{\frac{4}{9}} = \frac{2}{3} = \frac{6}{9} = 0.666\cdots$

12) a) $5x + 10y = 80, \quad 10x + 5y = 70$

b) $x = 4, \quad y = 6$

13) a) $xy + 2x + 2y + 4.$

b) $xy + 2x + 2y + 4 = xy + 2(x + y) + 4 = 143 + 2 \times 24 + 4 = 195$

14) a) $\sqrt{2}$ centimetre, $\sqrt{3}$ centimetre, $\sqrt{5}$ centimetre

b) $\sqrt{2} + \sqrt{3} + \sqrt{5} = 1.41 + 1.73 + 2.23 = 5.37$ centimetre

15) a) Yes. Since $ABCD$ is a parallelogram, MB is parallel to DN. Two opposite sides are parallel and equal. So the shaded part is a parallelogram.

b) In triangle ABQ, PM is parallel to BQ.

$$\frac{AM}{BM} = \frac{AP}{PQ}$$

Since $AM = BM$ we can say $AP = PQ$.

Similarly $PQ = QC$. That is $AP = PQ = QC$.

c) 12cm

16) a) $b = x + 1, \ c = x + 2 \ d = x + 3$

b) $bc - ad = (x + 1)(x + 2) - x(x + 3)$

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

$= 2$

c) $bc - ad = 2$, therefore $ad = 70$

$ad - 2 = 70 - 2 = 68$

17) a) $x + y = 4, \quad x + 3y = 10$

b) $x = 1$ and $y = 3$

c) 20 centimetre and 4 centimetre

18) a) 2 centimetre

b) 3 square centimetres

c) $\sqrt{3}$ centimetre

19) Construction

20) a) $11 = 6^2 - 5^2$

b) $a + b = N$

c) $p - q = 1$

21) a) $x + y = 7, 10y + x = 10x + y + 27$

Equations are $y + x = 7$ and $y - x = 3$

b) $x = 2$ and $y = 5$

Therefore the two-digit number is 25.

22) a) $xy - x - y + 1.$

b) $(x - 1)(y - 1) = xy - (x + y) + 1 = 70 - 17 + 1 = 54.$

23) a) $u + 6a = 24, u + 10a = 36$

b) By solving the equations we get $u = 6, a = 3$

c) $v = 6 + 3 \times 12 = 42\, m/s$

24) a) $PQ = \frac{1}{2}BC = \frac{1}{2} \times 12 = 6$

b) $SR = 6$ centimetre

c) $PS = 4$ centimetre and $QR = 4$ centimetre

d) Parallelogram

25) a) $xy = (x + 4)(y - 3)$ $\qquad$ $xy = (x + 8)(y - 4)$

$xy = xy - 3x + 4y - 12$ $\qquad$ $xy = xy - 4x + 8y - 32$

$4y - 3x = 12$ $\qquad$ $2y - x = 8$

b) By solving $x = 4, y = 6$

c) Sides of middle rectangle are $4 + 4 = 8$ and $6 - 3 = 3$

26) a) $\sqrt{2}$ centimetre

b) $\sqrt{2}$ centimetre, $\sqrt{3}$ centimetre and 1 centimetre

c) $\sqrt{10}$ centimetre and 1 centimetre

d) 11 centimetre

27) Hint : Draw a line 10 cm long and divide it into three equal parts. Draw a circle with one of these segments as the radius. Then, draw the regular hexagon with vertices on this circle.

28) a) $\sqrt{2}$ metre

b) 2 metre

c) $3\sqrt{2} + 2$ metre

29) a) $4, 3, 5$

b) $4n^2 + 1 = 17$

$n = 2$

Smallest side $= 4n = 4 \times 2 = 8$

c) $4n^2 - 1 = 399$

$4n^2 = 400$

Largest number $= 4n^2 + 1 = 400 + 1 = 401$