DISTRICT PANCHAYATH KASARAGOD

EQUIP 2024

(Educational Quality Improvement Programme for class ten)

Student Support Material for Class X

MATHEMATICS

English Medium

DIET KASARAGOD

EQUIP 2024

Chief Co-ordinators	:	**Nandikeshan N.** Deputy Director Education, Kasaragod **Dr. Raghurama Bhat K.** Principal, DIET Kasaragod
Co-ordinator	:	**Madhusoodanan V.** Lecturer, DIET Kasaragod
Resource Team		
Mathematics	:	Santhosh Kumar K., GVHSS Kayyur Dileep K.V., Durga HSS Kanhangad Jaya M.A., GHS Thayyeni
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ആശംസ

വികേന്ദ്രീകൃത ആസൂത്രണത്തിലൂടെയും നിർവ്വഹണത്തിലൂടെയും കേരളത്തിലെ ആരോഗ്യ വിദ്യാഭ്യാസ മേഖലകളെ ദേശീയ തലത്തിൽ ഒന്നാമതെത്തിക്കാൻ നമുക്ക് കഴിഞ്ഞിട്ടുണ്ട്. ഈ നേട്ടങ്ങൾ കൈവരിക്കാൻ പ്രാദേശിക ഭരണകൂടങ്ങൾ സ്തുത്യർഹമായ പങ്കുവഹിച്ചു. ദേശീയ സംസ്ഥാനതല പഠനങ്ങൾ നമ്മുടെ കുട്ടികളുടെ പഠനനിലവാരം ഇനിയും ഉയരേണ്ടതുണ്ട് എന്ന സൂചനയാണ് നൽകുന്നത്. പഠനവിടവുകൾ പരിഹരിക്കുന്നതിനുവേണ്ടി കാസർകോട് ജില്ലാ പഞ്ചായത്തിന്റെ നേതൃത്വത്തിൽ പൊതുവിദ്യാഭ്യാസ വകുപ്പും കാസർകോട് ഡയറ്റും ഒത്തുചേർന്ന് നടപ്പാക്കുന്ന **'എക്വിപ്പ്' (EQUIP)** പഠനപരിപോഷണ പരിപാടിക്ക് എല്ലാ പിന്തുണയും ഉറപ്പുതരുന്നു. പന്ത്രണ്ടാം ക്ലാസിലെ കുട്ടികൾക്കുവേണ്ടി ആദ്യമായാണ് ഇത്തരത്തിലൊരുദ്യമം. പൊതുപരീക്ഷകളെ അഭിമുഖീകരിക്കുന്ന പത്തും പന്ത്രണ്ടും ക്ലാസിലെ കുട്ടികളുടെ പഠനപ്രവർത്തനങ്ങളുടെ മികവിന്റെ അടയാളമായി മാറുകയാണ് വാർഷിക പരീക്ഷകൾ. അറിവിന്റെ തെളിമയോടെ ഓരോ വിദ്യാർത്ഥിക്കും പരീക്ഷ എഴുതാൻ കഴിയണം. വിദ്യാർത്ഥികളുടെ ജീവിതത്തിലെ ഏറ്റവും പ്രധാനപ്പെട്ട പരീക്ഷകൾക്ക് വേണ്ടി തയ്യാറാക്കിയ പഠനപിന്തുണാസാമഗ്രിക്ക് എല്ലാവിധ ആശംസകളും നേരുന്നു. നന്നായി പഠിക്കുക. പരീക്ഷയെ സധൈര്യം നേരിടുക. തളരാതെ മുന്നോട്ട്. വിജയം നിങ്ങളോടൊപ്പമുണ്ട്. ആശംസകൾ.

ശ്രീമതി ബേബി ബാലകൃഷ്ണൻ
ജില്ലാ പഞ്ചായത്ത് പ്രസിഡന്റ്
കാസർകോട്

ആശംസ

കാസർകോട് ജില്ലാ പഞ്ചായത്തിന്റെ നേതൃത്വത്തിൽ ജില്ലയിലെ പൊതുവിദ്യാഭ്യാസ മേഖലയെ ശക്തിപ്പെടുത്തുന്നതിന് നിരവധി പ്രവർത്തനങ്ങളാണ് നടന്നുവരുന്നത്. പൊതു വിദ്യാഭ്യാസ മേഖലയെ പൂർവ്വാധികം കരുത്തോടെ നാം മുന്നോട്ട് നയിക്കുകയാണ്. ഈ ഘട്ടത്തിലാണ് കാസർകോട് ജില്ലാ പഞ്ചായത്തും, പൊതുവിദ്യാഭ്യാസ വകുപ്പും, വിദ്യാഭ്യാസ പരിശീലന കേന്ദ്രവും (DIET) പത്താം ക്ലാസ്, പ്ലസ്ടു വിദ്യാർത്ഥികളുടെ പഠനവിടവുകൾ പരിഹരിക്കുന്നതിനും ആത്മവിശ്വാസത്തോടെ പൊതുപരീക്ഷയെ നേരിടാൻ അവരെ പ്രാപ്തരാക്കുന്നതിനും വേണ്ടി പഠനപരിപോഷണ സാമഗ്രി തയ്യാറാക്കുന്നത്. നിരന്തരമായ ഇടപെടലിന്റെ തുടർച്ചയായി ഈ വർഷം ആദ്യമായിട്ടാണ് പ്ലസ്ടു വിദ്യാർത്ഥികൾക്കുവേണ്ടി ജില്ലാ പഞ്ചായത്ത് പിന്തുണാസാമഗ്രി തയ്യാറാക്കുന്നത്. പ്രധാനപ്പെട്ട ആറ് വിഷയങ്ങളിലാണ് ഈ വർഷം തയ്യാറാക്കുന്നതെങ്കിലും അടുത്തവർഷം മറ്റു വിഷയങ്ങളിലും കുട്ടികൾക്ക് പിന്തുണ നൽകാൻ കഴിയുമെന്ന് പ്രതീക്ഷിക്കുന്നു. കുട്ടികളുടെ അക്കാദമിക മികവ് ഉറപ്പുവരുത്തിക്കൊണ്ട് മികച്ച ഗ്രേഡുകൾ നേടാൻ അവരെ സജ്ജമാക്കാൻ '**എക്വിപ്പ് 2024**' എന്ന പേരിൽ തയ്യാറാക്കിയ ഈ പദ്ധതിക്ക് കഴിയട്ടെയെന്ന് ആശംസിക്കുന്നു.

സ്നേഹപൂർവ്വം

അഡ്വ. സരിത എസ്.എൻ.
ആരോഗ്യ-വിദ്യാഭ്യാസ സ്ഥിരം സമിതി
അധ്യക്ഷ, ജില്ലാ പഞ്ചായത്ത്,
കാസർകോട്

ആശംസ

ജില്ലയിലെ അക്കാദമിക പ്രവർത്തനങ്ങളെ ഏകോപിപ്പിച്ച് മുന്നോട്ട് നയിക്കുന്ന ഉത്തരവാദിത്തമാണല്ലോ ജില്ലാ വിദ്യാഭ്യാസ പരിശീലന കേന്ദ്രങ്ങൾ (DIET) കാലങ്ങളായി ചെയ്തുവരുന്നത്. മനുഷ്യവിഭവശേഷിയിൽ പരിമിതികൾ ഉള്ളപ്പോൾ തന്നെ പ്രീ-പ്രൈമറി തലം മുതൽ ഹയർ സെക്കൻഡറി തലം വരെയുള്ള മേഖലകളിൽ വിവിധങ്ങളായ പദ്ധതികൾ ആസൂത്രണം ചെയ്യാനും നിർവഹിക്കാനും ഡയറ്റുകൾക്ക് ഇതുവരെ കഴിഞ്ഞിട്ടുണ്ട്. ഡയറ്റ് കാസർകോടിന്റെ നേതൃത്വത്തിൽ പത്താം തരത്തിലെ കുട്ടികളുടെ പഠനപ്രശ്നങ്ങൾ മറികടക്കാൻ കഴിഞ്ഞ കുറച്ച് വർഷങ്ങളായി വിദ്യാഭ്യാസ വകുപ്പ് നടപ്പിലാക്കുന്ന പദ്ധതിയാണ് **EQUIP (Educational Quality Improvement Programme).** അതതു വർഷത്തെ കുട്ടികളുടെ പഠനപ്രശ്നങ്ങൾ പരിഗണിച്ചുകൊണ്ടാണ് പ്രവർത്തനങ്ങൾ ചിട്ടപ്പെടുത്തുന്നത്. ഈ പദ്ധതിയുടെ ഭാഗമായി പത്താംതരത്തിലെയും പ്ലസ്ടുവിലെയും പരീക്ഷയെ അഭിമുഖീകരിക്കാൻ കുട്ടികളെ സഹായിക്കുന്ന വിവിധ വിഷയബന്ധിതമായ ചോദ്യമാതൃകകൾ യൂണിറ്റടിസ്ഥാനത്തിൽ പരിചയപ്പെടുത്താനാണ് ഉദ്ദേശിക്കുന്നത്. ജില്ലാ പഞ്ചായത്തിന്റെ സഹായത്തോടെ മലയാളത്തിലും ഇംഗ്ലീഷിലും കന്നഡയിലും പത്താംതരത്തിൽ ഐ.ടി. ഒഴിച്ചുള്ള എല്ലാ വിഷയങ്ങളിലും പ്ലസ്ടുവിൽ പ്രയാസകരമായ ആറ് വിഷയങ്ങളിലും പുസ്തകങ്ങൾ തയ്യാറാക്കി നൽകാനാണ് ഉദ്ദേശിക്കുന്നത്. ഈ അധ്യയന വർഷം പത്താംതരം/പ്ലസ്ടു പരീക്ഷ എഴുതുന്ന മുഴുവൻ കുട്ടികൾക്കും ഈ പദ്ധതിയുടെ പ്രയോജനം ലഭിക്കുമെന്ന് പ്രതീക്ഷിക്കുന്നു. വ്യത്യസ്ത പഠനവേഗതയും പഠനമികവുമുള്ള എല്ലാ വിഭാഗം കുട്ടികൾക്കും ഈ സാമഗ്രി പ്രയോജനപ്പെടട്ടെ എന്ന് ആശംസിക്കുന്നു. അധ്യാപകരുടെ ആത്മാർത്ഥമായ പിന്തുണയും പ്രോത്സാഹനവും അനിവാര്യമായ ഈ ഉദ്യമത്തിൽ എല്ലാവരുടെയും സഹായ സഹകരണങ്ങൾ പ്രതീക്ഷിച്ചുകൊണ്ട് ഏവർക്കും വിജയാശംസകൾ നേരുന്നു.

ആശംസകളോടെ,

ഡോ. രഘുരാമ ഭട്ട് കെ.
പ്രിൻസിപ്പാൾ
ഡയറ്റ് കാസർകോട്

ആമുഖം

കാസർകോട് ജില്ലാ പഞ്ചായത്തിന്റെ നേതൃത്വത്തിൽ ജില്ലയിലെ പൊതുവിദ്യാഭ്യാസം ശക്തിപ്പെടുത്തുന്നതിന് വ്യത്യസ്തങ്ങളായ നിരവധി പ്രവർത്തനങ്ങൾ നടന്നുവരികയാണ്. അതേസമയം ദേശീയ-സംസ്ഥാന പഠനങ്ങൾ നമ്മുടെ ജില്ലയിലെ കുട്ടികളുടെ പ്രകടനം ഇനിയും മെച്ചപ്പെടേണ്ടതുണ്ട് എന്ന സൂചനയാണ് നൽകുന്നത്. ഈ പശ്ചാത്തലത്തിലാണ് ജില്ലയിലെ പൊതുവിദ്യാലയങ്ങളിൽ നിന്ന് 2023-24 അധ്യയനവർഷം എസ്.എസ്.എൽ.സി., പ്ലസ്ടു പരീക്ഷകൾ അഭിമുഖീകരിക്കുന്ന കുട്ടികൾക്ക് പഠനപിന്തുണ നൽകുന്നതിന് ജില്ലാ പഞ്ചായത്തിന്റെയും പൊതുവിദ്യാഭ്യാസ വകുപ്പിന്റെയും സംയുക്താഭിമുഖ്യത്തിൽ വ്യത്യസ്ത വിഷയങ്ങളിൽ പഠനസാമഗ്രികൾ തയ്യാറാക്കേണ്ടതിന്റെ ആവശ്യകത ജില്ലാതല ഉന്നതാധികാര യോഗങ്ങളിൽ ചർച്ചചെയ്യപ്പെട്ടത്. ഇതിന്റെ അടിസ്ഥാനത്തിൽ ഡയറ്റ് കാസർകോടിന്റെ അക്കാദമിക നേതൃത്വത്തിൽ ജില്ലയിലെ മികച്ച അധ്യാപകരെ ഉൾപ്പെടുത്തിക്കൊണ്ട് പത്താംതരത്തിൽ ഐ.ടി. ഒഴിച്ചുള്ള എല്ലാ വിഷയങ്ങളിലും പ്ലസ്ടുവിൽ ഏറ്റവും പ്രയാസമേറിയ ആറ് വിഷയങ്ങളിലും (ഗണിതം, ഫിസിക്സ്, കെമിസ്ട്രി, ഇംഗ്ലീഷ്, അക്കൗണ്ടൻസി, ഇക്കണോമിക്സ്) പഠനപിന്തുണാസാമഗ്രികൾ തയ്യാറാക്കിയിരിക്കുക യാണ്. സ്കൂൾ വിദ്യാഭ്യാസം പൂർത്തീകരിച്ച് ഉന്നത വിദ്യാഭ്യാസമേഖലയിലേക്ക് പ്രവേശിക്കുന്ന പ്ലസ്ടു വിദ്യാർത്ഥികൾക്ക് പഠനപിന്തുണ നൽകുന്ന സാമഗ്രി ജില്ലയിൽ ആദ്യമായാണ് തയ്യാറാക്കുന്നത്. ജില്ലയിൽ നിന്നും പൊതുപരീക്ഷയെ അഭിമുഖീകരിക്കുന്ന മുഴുവൻ എസ്.എസ്.എൽ.സി, പ്ലസ്ടു വിദ്യാർത്ഥികൾക്കും ആത്മവിശ്വാസം വളർത്തുന്നതിനും ഉന്നതവിജയം നേടുന്നതിനും ഈ ഉദ്യമം സഹായകമാകട്ടെയെന്ന് ആത്മാർത്ഥമായി ആഗ്രഹിക്കുന്നു. ഈ പദ്ധതിയെ നെഞ്ചേറ്റിയ പ്രിയപ്പെട്ട അധ്യാപക സുഹൃത്തുക്കൾക്ക് ഈ പുസ്തകത്തെ ഫലപ്രദമായി ഉപയോഗിക്കാൻ കഴിയട്ടെ. എല്ലാവർക്കും വിജയാശംസകൾ.

ശ്രീ. എൻ. നന്ദികേശൻ
ജില്ലാ വിദ്യാഭ്യാസ ഉപഡയറക്ടർ
കാസർകോട്

MATHEMATICS

SSLC - English Medium

Chapter - 1

ARITHMETIC SEQUENCES

✶ **Arithmetic Sequences :** A sequence got by starting with any number and adding a fixed number repeatedly is called an Arithmetic Sequences.

✶ **Common Difference :** The constant difference got by subtracting from any term the just previous term is called common difference of arithmetic sequence.

Eg : In the arithmatic sequence 4, 7, 10.......

(a) What is the common difference?

(b) Write the next two terms of this sequence.

Answer : (a) Common Difference = $x_2 - x_1 = 7 - 4 = 3$

(b) $x_4 = 10 + 3 = 13$

$x_5 = 13 + 3 = 16$

✶ In an arithmetic sequence, if the first term is 'f' and common difference is 'd' then,

n^{th} term, $x_n = f + (n - 1)d = dn + (f - d)$

✶ Algebra of an arithmetic sequence is of the form an + b where a is the common difference and b = f - d.

Eg : In the arithmatic sequence 4, 10, 16.......

(a) Find 25^{th} term.

(b) Write the algebra form of this sequence.

Answer : (a) $x_{25} = f + 24d$

$= 4 + 24 \times 6$

$= 148$

(b) Algebra of the sequence = an + b

$= 6n + -2$

$= 6n - 2$

a = 6
b = f - d= 4 - 6= -2

✶ Common Difference = $\frac{\text{Term Difference}}{\text{Position Difference}}$

Eg : In an arithmatic sequence, 6^{th} term is 28 and 13^{th} term is 63.

(a) Find the Common Difference.

(b) Find the first term of this sequence.

(c) Write the algebra of this arithmetic sequence.

Answer : Given $x_6 = 28$

$x_{13} = 63$

(a) Common Difference = $\dfrac{\text{Term Difference}}{\text{Position Difference}}$

$$= \frac{63 - 28}{13 - 6} = \frac{35}{7} = 5$$

(b) First term, $x_1 = x_6 - 5d$

$= 28 - 5 \times 5$

$= 28 - 25$

$= 3$

(c) Algebra of the sequence, $x_n = an + b$

$= 5n + -2$

$= 5n - 2$

$a = 5$
$b = f - d = 3 - 5 = -2$

✶ If the number of terms (n) is odd,

First term + Last term = $2 \times$ Middle term

Sum of all the terms = $n \times$ Middle term

Eg : 1) In an arithmetic sequence sum of first 11 terms is 242. Find 6^{th} term of this sequence.

Answer : $S_{11} = 242$

$\therefore 11 \times x_6 = 242$

$$x_6 = \frac{242}{11} = 22$$

Eg : 2) 7^{th} term of an arithmetic sequence is 25. Find sum of first 13 terms of the sequence.

Answer : $S_{13} = 13 \times x_7$

$= 13 \times 25$

$= 325$

✶ If the number of terms (n) is even, all terms can be grouped into $^{n}/_{2}$ pairs.

✶ In an arithmetic sequence, if the sums of the positions of two pairs of terms are equal, then the sums of the pair of the terms are also equal.

Eg : (1) In an arithmetic sequence sum of 1^{st} and 20^{th} term is 100.

(a) Find the sum of 10^{th} and 11^{th} term of this sequence.

(b) Find the sum of first 20 terms of this arithmetic sequence.

Answer : (a) Given $x_1 + x_{20} = 100$

$\therefore x_{10} + x_{11} = 100$

(b) $s_{20} = 10 \text{ x } (x_1 + x_{20}) = 10 \text{ x } 100 = 1000$

Eg : (2) In an arithmetic sequence, sum of the first 6 terms is 72.

(a) Find the sum of 3^{rd} term and 4^{th} term.

(b) Write two arithmetic sequence like this.

Answer : (a) Given $s_6 = 72$

$3(x_3 + x_4) = 72$

$x_3 + x_4 = \frac{72}{3} = 24$

(b) i) 2, 6, 10, 14, 18, 22

ii) 7, 9, 11, 13, 15, 17

✶ Sum of first n terms of an Arithmetic Sequence,

$$S_n = \frac{n}{2}[x_1 + x_n]$$

✶ For the arithmetic sequence, $x_n = an + b$. The sum of first 'n' terms,

$$S_n = \frac{an(n+1)}{2} + bn$$

✶ Algebra of the sum of first n terms of an arithmetic sequence is $pn^2 + qn$; where $p = \frac{a}{2}$

and $q = \frac{a}{2} + b$

Eg : 1) Find the sum of first 25 terms of the arithmetic sequence 2, 5, 8, 11,........

Answer : a = common difference = $5 - 2 = 3$

$b = f - d = 2 - 3 = -1$

$n = 25\frac{a}{2}$

$$\therefore S_n = \frac{an\,(n+1)}{2} + bn$$

$$S_{25} = \frac{3 \text{ x } 25 \text{ x } 26}{2} + -1 \times 25 = 950$$

Eg : 2) Algebra of an arithmetic sequence is $3n + 4$. Find the sum of first 20 terms of this sequence.

Answer : $x_n = 3n + 4$

$a = 3, b = 4$

$n = 20$

$$\therefore S_{20} = \frac{3 \times 20 \times 21}{2} + 4 \times 20 = 710$$

Eg : 3) Sum of first n terms of an arithmetic sequence is $3n^2 - 2$.

a) Find the first term.

b) Find the common difference.

c) Write the first three terms of the sequence.

Answer : $S_n = 3n^2 - 2n$

i) $S_1 = 3 \times 1^2 - 2 \times 1 = 1$

$\therefore$ First term, $x_1 = 1$

ii) $S_n = 3n^2 - 2$

$p = 3$

$$\therefore \frac{d}{2} = 3 \Rightarrow d = 6$$

c) $x_1 = 1$

$x_2 = 1 + 6 = 7$

$x_3 = 7 + 6 = 13$

1, 7, 3, ...

✶ If f_1 and f_2 are the first term of two arithmetic sequence having same common difference then difference of sums of their first n terms = n x (f_1 - f_2)

Eg : In the arithmetic sequences, 4, 10, 16,............ and 2, 8, 14, ..., find the difference of the sums of their first 20 terms.

Answer : $f_1 = 4$, $f_2 = 2$

∴ Difference of the sum of their first 20 terms = n x (f_1 - f_2)

= 20 x (4 - 2) = 20 x 2 = 40

More Questions :

1. Which is the fifth term of the arithmetic sequence 11, 15, 19, 23, ...

   (25, 26, 27, 28)

2. Find the 19th term of the arithmatic sequence 18,17,16...........

   (1, -1, 0, 36)

3. The algebraic form of an arithmetic sequence is 4n-3. What is the common difference ?

   (4,-4,3,-3)

4. a) If 5^{th} term and 8^{th} term of an arithmetic sequence are 16 and 25 respectively then find the common difference.

   b) Find the difference between 10 th and 20^{th} terms

5. First term of an arithmetic sequence is 15 and the common difference is 4.

   (a) Write the next two terms of this sequence.

   (b) Write the algebra of the arithmetic sequence.

6. In an arithmetic sequence, 5^{th} term is 10 and 7th term is 16. Find 60^{th} term of this sequence.

7. n^{th} term of an arithmetic sequence is given by 3n-4.

   a) Find the common difference

   b) Find the 10^{th} term

8. a) Write the algebraic form of the arithmetic sequence 1,6,11...........

b) Find the 15^{th} term of this sequence

9. Sum of first n terms of an arithmetic sequence is $3n^2+2n$.

Prove that if 9 is added to the sum of first certain terms of the arithmetic sequence 16, 24, 32, 40, ... then it is a perfect square.

10. The sum of n terms to an arithmetic sequnce is $4n^2-3n$.

Find,

a) The first term

b) Find the common difference

c) Find the n^{th} term

11. The sum of first nine terms of an arithmetic sequence is 261 and sum of next 6 terms is 444.

a) Find 5^{th} and 8^{th} term

b) Find the first term and common difference

c) Write the algebraic expression of the arithmetic sequence

12. a) Write the sequence of natural number which leaves remainder 2 on division by5.

b) Is it an arithmetic sequence? Why?

c) Is 103 a term of this sequence? Why?

d) Can 102 be the difference of any two terms of this sequence?

13. In the arithmetic sequence 4, 10, 16,............

a) Find the common difference.

b) Find 21^{st} term of this sequence.

c) Find the difference of 11^{th} and 21^{st} terms of this sequence.

14. In an arithmetic sequence, 6^{th} term is 28 and 13^{th} term is 63.

a) Find the common difference.

b) Write the first four terms of this sequence.

c) How many times of common difference must be added to 10^{th} term to get 23^{rd} term of this sequence.

d) Find 23^{rd} term of this sequence.

15. a) What is the remainer when 999 is divided by 5.

b) Write the smallest and largest three digit number which leaves remainder 3 on division by 5.

c) How many three digit number are there which leaves remainder 3 on division by 5.

16. a) Write the algebra of the arithmetic sequence 5, 8, 11,.............

b) Write the algebra of the arithmetic sequence $\frac{5}{9}, \frac{8}{9}, \frac{11}{9}$,.............

c) Prove that there is no natural number in the arithmetic sequence $\frac{5}{9}, \frac{8}{9}, \frac{11}{9}$,.............

17. In an arithmetic sequence, first term is 40 and common difference is -3.

a) Write the next two terms of the sequence.

b) Is 0 a term of this sequence? Why?

c) Which is the largest negative number of this sequence.

18. a) Write the first whole number in the arithmetic sequence $\frac{1}{4}, \frac{6}{4}, \frac{11}{4}$,.............

b) Write the algebra of this sequence.

c) Write the first 5 whole numbers in this sequence.

19. Read the following and understand the mathematical idea expressed in it and answer the questions that follows.

1, 4, 9, 16, ... are the squares of the counting numbers. The remainders got by dividing the square numbers with natural numbers have a cyclic property. For example the remainders on dividing these numbers by 3 are tabulated here

Number	1	4	9	16	25	36	49	....
Remainder	1	1	0	1	1	0	1	....

a) Write the 8^{th} term of the sequence 1, 4, 9, 16......

b) What is the remainder when 100 is divided by 3

c) Which are the possible remainders when a perfect square is divided by 3

d) Find the remainder when the numbers of the sequence 5^2, 8^2, 11^2, ... are divided by 3.

e) What is the remainder that leaves on dividing the terms of the sequence 4^2, 7^2, 10^2, ... by 3.

20. Read the mathematical concept carefully and answer the following.

$1 = 1$

$1+2 = 3$

$1+2+3 = 6$

$1+2+3+4=10$

Consider the sequence 1,3,6,10.......

It is the sum of natural numbers. These numbers are called traingle numbers.

$1+3 = 4$; $3+6 = 9$, $6+10 = 16$ ....

1, 4, 9, 16, ... are called square numbers. Each square number is the sum of two consecutive triangle numbers.

a) Find the next term of the sequence 1,3,6,10............

b) Find the fifth square number

c) Write the algebraic form of the sequence of traingle numbers

d) Write the algebraic expression of the sequence of square numbers.

e) If 20th triangle number is x and 21st triangle number is y then y-x = ...

21.

1

3 5 7

9 11 13 15 17

....

....

....

a) Write the next two lines of this pattern

b) How many numbers are there in 10^{th} row.

c) Find the sum of all numbers in the 10^{th} row..

d) Write the algebraic form of the arithmetic sequence 1, 3, 5, 7, ...

22. Consider the pattern

1

2 3 4

5 6 7 8 9

10 11 12 13 14 15 16

....

....

a) Write the next line

b) Write the sequence of number of numbers in each raw.

c) Write the algebraic form of the sequence 1,3,5,7...........

d) How may numbers are there in 30^{the} raw

e) Write the first and last number in the 30th row.

Chapter - 2

CIRCLES

✶ If we join the ends of a diameter of a circle to a point:

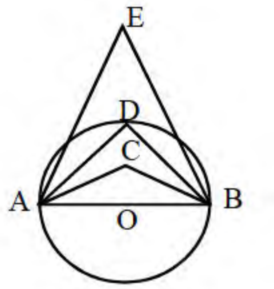
(i) On the circle, we get a right angle.

(ii) Inside the circle, we get an angle greater than 90^0.

(iii) Outside the circle, we get an angle less than 90^0.

✶ Angle in a semicircle is right angle.

Eg : In the circle, AB is the diameter. C, D, E are the points inside the circle, on the circle and outside the circle respectively. Choose the correct measure of following angles from the bracket.



(i) $\angle AEB$ (ii) $\angle ACB$ (iii) $\angle ADB$ (145^0, 90^0, 75^0)

Answer :(i) $\angle AEB = 75^0$ (ii) $\angle ACB = 145^0$ (iii) $\angle ADB = 90^0$

✶ The angle made by any arc of a circle on the alternate arc is half the angle made at the centre.

✶ All angles made by an arc on the alternate arc are equal.

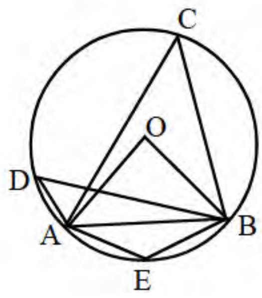
✶ A pair of angles on an arc and its alternate arc are supplementary.

Eg : In the figure, $\angle AOB = 140^0$

Find the measure of i) $\angle ACB$

ii) $\angle ADB$

iii) $\angle AEB$



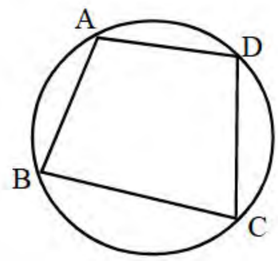
Answer : i) $\angle ACB = 1/2, \angle AOB = 70^0$

ii) $\angle ADB = \angle ACB = 70^0$

iii) $\angle AEB = 180 - \angle ACB = 180 - 70 = 110^0$

✶ If all four vertices of a quadrilateral are on a circle (Cyclic Quadrilateral), then opposite angles are supplementary.

Eg : In the figure, A, B, C, D are the points on the circle. If $\angle ADC = 100^0$, what is the measure of $\angle ABC$?



Answer : $\angle ADC + \angle ABC = 180^0$

$\angle ABC = 180 - \angle ADC = 180 - 100 = 80^0$

✶ Construction of circumcircle and triangle of given angles.

Eg : Draw a triangle of circum radius 3 cm and two of the angles 40^0 and 75^0.

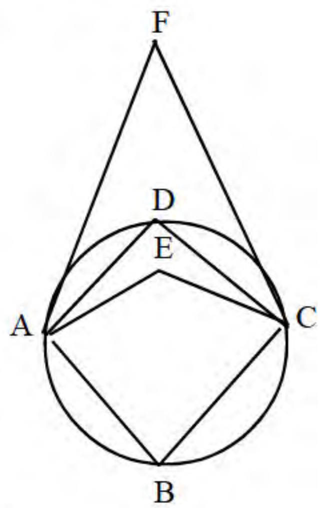
✶ If one vertex of a quadrilateral is outside the circle drawn through the other three vertices then the sum of the angles at this vertex and opposite vertex is less than 180^0 and if this vertex is inside the circle, the sum is more than 180^0.

Eg : Write the appropriate answers for the following from the bracket. (140^0, 180^0, 220^0)

a) $\angle ADC + \angle ABC$

b) $\angle AEC + \angle ABC$

c) $\angle AFC + \angle ABC$



Answer :

a) Since ABCD is cyclic quadrilateral,

$\angle ABC + \angle ADC = 180^0$

b) Since E lies inside the circle,

$\angle AEC + \angle ABC = 220^0$ (Greater than 180^0)

c) Since F lies outside the circle, $\angle AFC + \angle ABC = 140^0$ (Less tahn 180^0)

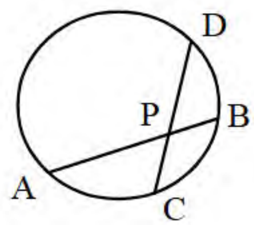
✶ If two chords of a circle intersect within the circle, then the products of the parts of the two chords are equal.

✶ If two chords of a circle intersect within the circle, then the rectangles formed by the parts of the same chord have equal area.

Eg : In the figure AB and CD are two chords and PA = 4 cm, PB = 8 cm.

i) Find $PC \times PD$

ii) If PC = 2 cm, find the length of PD.



Answer : i) $PC \times PD = PA \times PB = 4 \times 8 = 32$ cm

★ **Construction** : Drawing a rectangle of given measures and then constructing another rectangle having same area of the first rectangle.

Eg : Draw a rectangle of sides 5 cm and 3 cm, 4 cm. Draw another rectangle of the same area and width 7 cm.

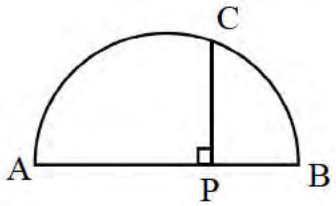
★ The product of the parts which a diameter of a circle is cut by a perpendicular chord, is equal to the square of half the chord.

★ The area of the rectangle formed of parts into which a diameter of a circle is cut by a perpendicular chord is equal to the area of the square formed by half the chord.

Eg : In this figure AB is the diameter and C is a point on the circle. Length of AB = 7 cm and PB = 3 cm.

i) What is the length of PA?

ii) Find the length of PC.



★ **Construction :**

i) Construction of a square of area equal to the area of given rectangle.

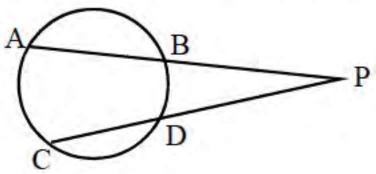
ii) Drawing a square or equilateral triangle of sides that cannot be measured by a scale.

Eg : Draw a rectangle of side 5 cm and 3 cm.

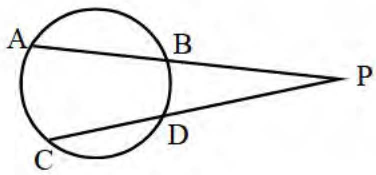
Draw a square of the same area.

★ If chords AB and CD of a circle is extended outside the circle to meet at a point P, then

PA x PB = PC x PD.



Eg : In the figure chords AB and CD are extended outside the circle to meet the point P. Length of AB = 3 cm, PA = 8 cm.



i) Find the length of PB.

ii) Find PC x PD.

iii) If length of PC is twice the length of PD, find the length of PD.

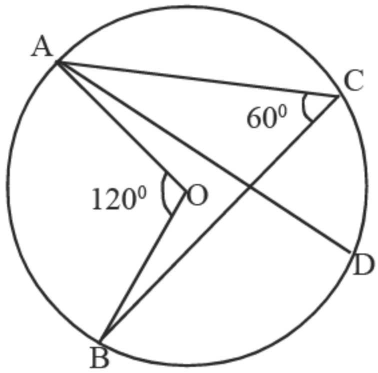
More Questions

1. In figure $\angle AOB = 120^0$

   $\angle ACB = 60^0$

   Find $\angle ADB$

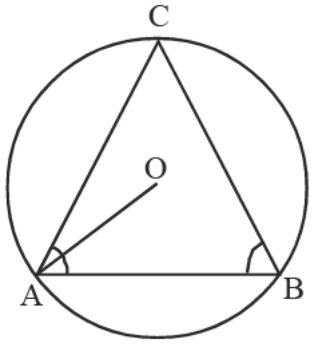
   $(30^0, 60^0, 120^0, 240^0)$



2. In the figure 'O' is the centre and A,B,C are points on the circle.

   $\angle OAC + \angle ABC =$ ....

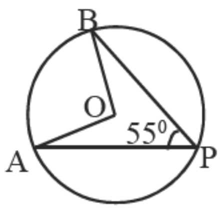
   $(45^0, \ 60^0, \ 90^0, \ 180^0)$



3. In the figure O is the centre of the circle.

   If $\angle APB = 55^0$, What is $\angle AOB$

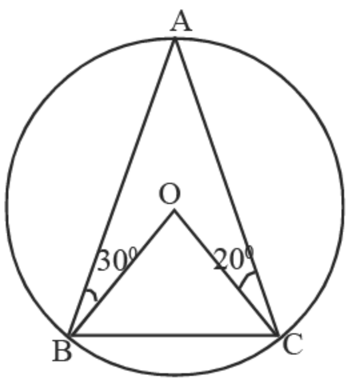
   $(55^0, \ 110^0, \ 125^0, \ 22\frac{1}{2}^0)$



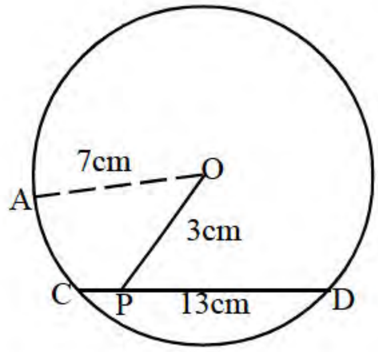
4. In figure 'O' is the centre and A,B,C are points on the circle.

   a) Find the measure of $\angle A$

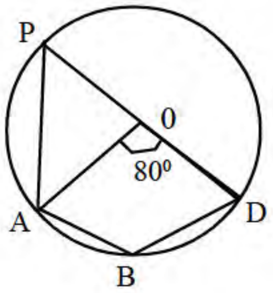
   b) In ΔBOC, Find $\angle OBC$.



5. In figure 'O' is the centre of the circle and a line from the centre intersect the chord. Find the length of each part of the chord.



6. In figure 'O' is the centre and $\angle AOD = 80^0$



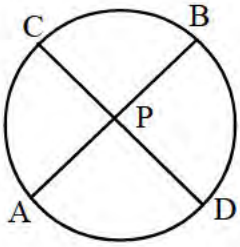
a) Find $\angle APD$

b) Find $\angle ABD$

7. In the figure PA = 4cm,

PB = 6cm, PC = 2cm,

Find PD.

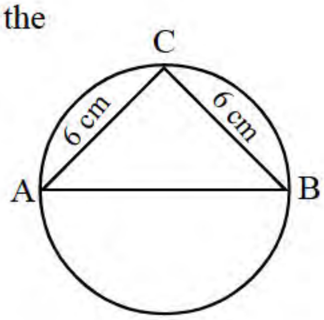


8. In the figure AB is the diameter of the circle. Length of the sides AC and BC is 6 cm.

i) Find $\angle ACB$.

ii) Write the angles of ΔABC.

iii) Find the area of the circle.

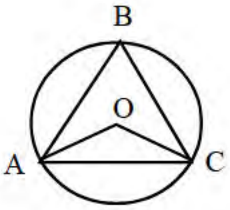


9. In the figure, O is the centre of the circle and the vertices of equilateral triangle ABD lies on the circle.

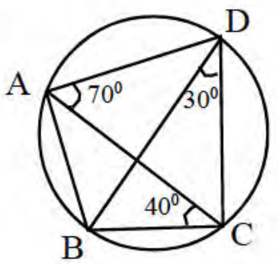
i) Write the angle measure of ΔAOC.

ii) If the radius of the circle is 6 cm.
What is the perpendicular distance from the centre to the side AC.

iii) Find length of the sides of ΔABC.



10. In the figure, A, B, C, D are the points on the circle.
$\angle BDC = 30^0$ $\angle ACB = 40^0$ $\angle DAC = 70^0$



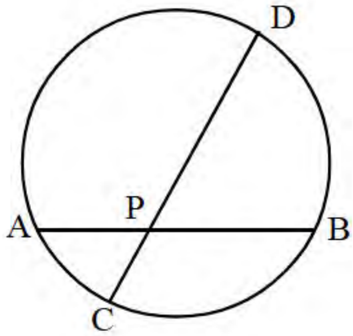
i) Find $\angle BAC$

ii) Find $\angle BCD$

iii) What is the measure of $\angle ABD$

iv) Find all the angle measure of quadrilateral ABCD.

11. Chords AB and CD of the circle intersects at the point P and AB = 21 cm, PA = 9 cm.



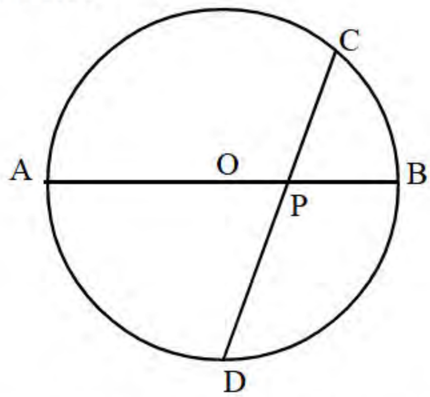
i) Find the length of PB.

ii) Find PC x PD

iii) If PC : PD = 1 : 3, find the length of PC.

12. In figure AB is the diameter and CD is a chord intesecting AB at P. AB = 16 cm;

CD = 19 cm, PC = 4cm



a) If PA = x then find PB

b) Find length of PD

c) Find the length of PA

13. Draw a rectangle of sides 4 cm and 3 cm. Construct a square of equal area.

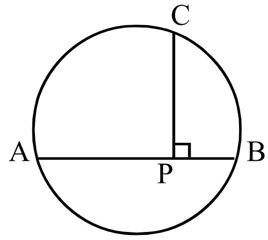
14. Draw a rectangle with sides 5 c.m., 3 cm. construct a square of equal area.

15. Draw a rectangle of sides 6 cm and 4 cm. Draw another rectangle with one side 7 cm and area equal to that of the first rectangle.

16. Draw a square of area 24 cm^2

17. Draw a rectangle of sides 5 cm and 3 cm. Draw a square of same area.

18. In the figure, AB is a diameter of the circle and PC is perpendicular to AB.
Length of PA is 3 cm more than PC and PB is 2 cm lies than PC.



i) If length of PC is taken as x, what are the length of PA and PB.

ii) Find the length of the diameter AB.

CHAPTER - 3

MATHEMATICS OF CHANCES

✶ Probability = $\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$

Eg : In a box, there are 5 blue balls and 3 white balls. If a ball is taken from the box without looking, what is the probability of getting a blue ball?

Answer : Total number of outcomes = Total number of balls in the box = 5 +3 = 8

Number of favourable outcomes = Number of blue balls = 5

Probability of getting a blue ball = $\frac{5}{8}$

Geometrical Probability = $\frac{\text{Number of favourable Parts / Area}}{\text{Total number of Parts / Area}}$

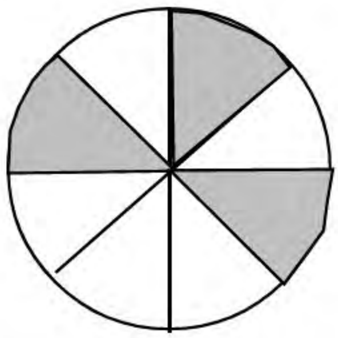
Eg : 1) If a dot is marked inside the circle without looking, what is the probability that the dot lies on the shaded part.

Answer : Total number of parts = 8

Number of favourable parts = 3

Probability of that the dot lies on the shaded region = $\frac{3}{8}$

Eg : 2) If a dot is marked inside the rectangle without looking, what is the probability that the dot lies inside the triangle.

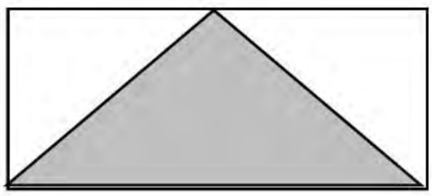


Answer : Let length of the rectangle = x, breadth = y

Area of the rectangle = xy

Area of the triangle = $\frac{1}{2}$ xy

Probability of dot being inside triangle = $\frac{\frac{1}{2}xy}{xy} = \frac{1}{2}$



✶ Probability of pairs = $\frac{\text{Number of favourable Pairs}}{\text{Total number of Pairs}}$

Eg : In class 10 A there are 30 boys and 20 girls and 10 B there are 15 boys and 25 girls. If a student is selected from each class, what is the probability that both are boys.

Answer :

	10 A	10 B
Boys	30	15
Girls	20	25
Total	50	40

Total number of pairs = 50 x 40 = 2000

Number of pairs in which both are boys = 30 x 15 = 450

Probability of being both boys = $\frac{450}{2000} = \frac{9}{40}$

More questions

1. Numbers from 1 to 25 are written in small papers and placed in a box. A paper is taken at random, without looking. Find the probability of getting an even number.

   $\left(\frac{13}{25}, \frac{12}{25}, \frac{9}{25}, \frac{11}{25}\right)$

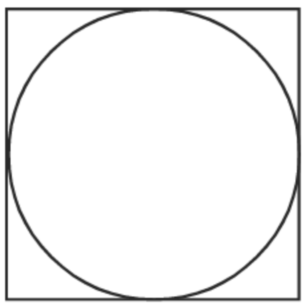
2. Letters of the word 'EXAMINATION' are written on different paper slip and put it in a box. One slip is taken at random. What is the probability of getting the letter 'A'?

   $\left(\frac{1}{11}, \frac{1}{10}, \frac{2}{11}, \frac{2}{10}\right)$

3. In a box, there are 10 slips numbered 1,2,3........10. If one slip is taken from the box, what is the probability of getting a prime number ?

   $\left(5/10, 4/10, 3/10, 6/10\right)$

4. In figure circle exactly fitting inside a square. Calculate the probability of a dot put without looking to be within the circle.



5. Two dice with faces numbered from 1 to 6 are rolled together.

   a) What are the possible sums?

   b) Which of these sums has the maximum probability?

6. In class 10 A, there are 30 boys and 20 girls. In 10 B, there are 20 boys and 15 girls. One student is to be selected from each class.

   a) How many ways selection can be done

   b) What is the probability of both being boys

   c) What is the probability of both being girls

   d) What is the probability of one girl and one boy.

7. In a box there are 3 black and 7 white balls. In another box, there are 4 black and 6 white balls. If One ball is taken from each box without looking into it.

   Find the probability that,

   a) both being black

   b) both being white

   c) Atlest one ball is black

8. There are 5 blue balls and 7 red balls in a box. In another box, there are 9 blue balls and 12 red balls. If a ball is taken from each box,

   i) What is the probability of getting a blue ball from first box.

   ii) Find the probability of getting a blue ball from second box.

   iii) Which box is more likely to get a blue ball.

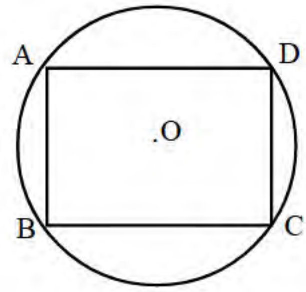
9. Numbers from 1 to 20 are written on slips of paper and put in a box. A slip is to be drawn from it.

   i) What is the probability of getting prime number?

   ii) What is the probability of getting a perfect square?

   iii) What is the probability of getting a number which is both a multiple of 3 and 2?

10. In the figure, vertices of square ABCD lies on the circle with centre O.



  i) If the radius of the circle is x, what is the length of diagonal of the square.

  ii) What is the area of the square?

  iii) If a dot is marked inside the circle, find the probability that the dot lies inside the square.

11. In a box, there are 20 balls of colours blue and yellow. If a ball is taken from the box without looking, the probability of getting a blue ball is $\frac{3}{5}$.

  a) How many blue balls are there in the box?

  b) Find the probability of getting a yellow ball.

  c) How many more yellow balls should be added to the box to get the probability $\frac{1}{2}$?

12. One is asked to say a two digit number.

  a) What is the probability of both digits being the same?

  b) What is the probability of both digits being prime?

  c) What is the probability of both digits being even?

Chapter - 4

SECOND DEGREE EQUATIONS

Second Degree Equations identities

$(x + y) x (x - y) = x^2 - y^2$

$(x + y)^2 = x^2 + 2xy + y^2$

$(x - y)^2 = x^2 + 2xy + y^2$

$(x + a) x (x + b) = x^2 + (a + b)x + ab$

Solutions of Equations

✶ $x^2 = k \Rightarrow x = \pm\sqrt{k}$

✶ $(x - a)^2 = k \Rightarrow x - a = \pm\sqrt{k}$, $x = a \pm\sqrt{k}$

✶ $(x + a)^2 = k \Rightarrow x + a = \pm\sqrt{k}$, $x = a \pm\sqrt{k}$

✶ $ax + b = 0 \Rightarrow ax = -b$, $x = \dfrac{-b}{a}$

✶ $ax^2 + bx + c = 0 \Rightarrow x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Eg : 1) $x^2 = 25 - x = \sqrt{25} = \pm 5$

$x^2 = 7 \Rightarrow x = \pm\sqrt{7}$

Eg : 2) $(x - 2)^2 = 81 \Rightarrow x - 2 = \sqrt{81} = \pm 9$

$x = 2 \pm 9$

$x = 2 + 9, 2 - 7$

$x = 11, -7$

Eg : 3) $(x + 3)^2 = 36 \Rightarrow x + 3 = \sqrt{36} = \pm 6$

$\therefore\ x = -3 \pm 6$

$x = -3 + 6 = 3$

$x = -3 - 6 = -9$

Complete the square and find the Solution.

Which number added to $x^2 + 4x$ to get a whole square?

$x^2 + 4x +$ .... $= (x +$ ....$)^2$

Add $\left(\frac{4}{2}\right)^2 = 4$ on both side. (Add the square of half of the coefficient of x)

$x^2 + 4x + 4 = (x + 2)^2$

Eg : 1) Find the solution of the equation $x^2 - 6x = 40$

Coefficient of x = -6

Half = $\frac{-6}{2} = -3$

Square = $(-3)^2 = 9$

Add 9 on both sides.

$x^2 - 6x + 9 = 40 + 9$

$(x - 3)^2 = 49$

$x - 3 = \sqrt{49} = \pm 7$

$x - 3 = \pm 7$

$x = 3 \pm 7$

$x = 3+7, 3 - 7 = 10, -4$

Eg : 2) When all the sides of a square are increased by 8 cm, the area becomes 1225 cm^2. If the length of one side of a small square is x,

a) What is the length of one side of the large square?

b) Formulate the equation relating the area of the large square.

$(x + 8)^2 = 1225$

c) What is the side length of the smaller square?

$x + 8 = 35$

$x = 35 - 8 = 27$ cm

Eg : 3) The length of a rectangleis 5 cm more than the width. Area is 204 cm^2.

a) If the width is x, what is the length?

length = x + 5

b) Find the length and width of the rectangle.

$x \times (x + 5) = 204$

$x^2 + 5x = 204$

$$x^2 + 5x + \left(\frac{5}{2}\right)^2 = 204 + \left(\frac{5}{2}\right)^2$$

$$\left(x + \frac{5}{2}\right)^2 = 204 + \frac{25}{4} = \frac{841}{4}$$

$$\therefore\ x + \frac{5}{2} = \frac{29}{2}$$

$$x = \frac{29}{2} - \frac{5}{2} = \frac{24}{2} = 12$$

Length = 12 + 5 = 17 cm

Width = 12 cm

Eg : 4) If all the sides of a square are reduced by 3 cms each, the area will be 81 sq.cms.

a) What is the length of one side of the small square?

b) Write the equation for the area of the small square.

$(x - 3)^2 = 81$

c) What is the length of one side of the large square?

$(x - 3)^2 = 81$

$x - 3 = \sqrt{81}$

$x - 3 = 9$

x = 9 + 3 = 12 cm

Eg : 5) Fill in the blank

$x^2 + 8x + 16 = (x + ...)^2$ (Ans : 4)

$x^2 + 24x + 144 = (x + ...)^2$ (Ans : 12)

$x^2 - 10x + 25 = (.......)^2$ (Ans : x-5)

$x^2 + 10x + ... = (x + 5)^2$ (Ans : 25)

$x^2 - 20x + ... = (x - 10)^2$ (Ans : 100)

Eg : 6) Which number added to $x^2 + 6x$ to get a perfect square.

(Ans : 100)

Eg : 7) The perimeter of a square is 100 meters and its area is 600 sq. mts.

a) Length + breadth = ...

Ans : 50

b) If the length is 25 + x, what is the breadth?

Ans : 25 - x

c) Find the length and breadth of the rectangle

Area = 600

$(25 + x) \times (25 - x) = 600$

$25^2 - x^2 = 600$

$625 - x^2 = 600$

$x^2 = 625 - 600$

$x^2 = 25$

$\therefore x = 5$ mts

Sides are 25 + 5 = 30 m, 25 - 5 = 20 m

Eg : 8) The perimeter of a rectangle is 100 cm and its area is 525 sq. cm

a) Length + breadth = ...

Ans : 50

b) If the length is x, what is the breadth?

Ans : 50 - x

c) Find the length and breadth of the rectangle.

$x \times (50 - x) = 525$

$50x - x^2 = 525$

$x^2 - 50x = -525$

$x^2 - 50x + 25^2 = -525 + 25^2$

$(x - 25)^2 = -525 + 625$

$(x - 25)^2 = 100$

$x - 25 = \sqrt{100} = \pm 10$

$x - 25 = 10$ Or $x - 25 = -10$

$x = 35$ Or $x = 15$

$\therefore$ Length = 35 cm

Breadth = 50 - 35 = 15cm

Eg : 9)One of the vertical sides of a right triangle is 3cms longer than the other. It's area is 54 sq. cms.

a) If the smaller perpendicular is x, what is the larger perpendicular?

Ans : x + 3

b) Find the length of all three sides of the triangle.

$$\frac{1}{2} \times x \times (x+3) = 54$$

$x^2 + 3x = 108$

$x^2 + 3x - 108 = 0$

a = 1
b = 3
c = 108

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{-3 \mp \sqrt{3^2 - 4\times 1\times {}^{-}108}}{2\times 1}$$

$$= \frac{-3 \pm \sqrt{9+432}}{2}$$

$$= \frac{-3 \pm \sqrt{441}}{2} = \frac{-3 \pm 21}{2}$$

$$\therefore x = \frac{-3+21}{2}, \frac{-3-21}{2}$$

$$x = \frac{18}{2} = 9$$

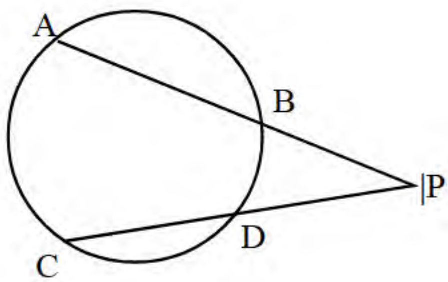
$\therefore$ Sides are 9, 12, 15 cms

Eg : 10) In the figure, lines AB and CD intersect at point P. PA=12cm, PB=4 cm, CD=13 cm

a) If PD = x then, what is PC?

Ans : 13 + x

b) What is the length of PD?



PA x PB = PC x PD

12 x 4 = (13 + x) x x

48 = 13x + x^2

x^2 + 13x - 48 = 0

$$x = \frac{-13 \pm \sqrt{13^2 + 4\times 1\times {}^{-}48}}{2}$$

$$= \frac{-13 \pm \sqrt{361}}{2}$$

$$x = \frac{-13+19}{2} = \frac{6}{2} = 3$$

$\therefore$ PD = 3 cm

Eg : 11) The sum of a number and its reciprocal is $\frac{5}{2}$.

a) If the number is x, what is it's reciprocal?

Ans : $\frac{1}{x}$

b) Find the numbers by forming a second degree equation.

$$x+\frac{1}{x}=\frac{5}{2}$$

$$\frac{x^2+1}{x}=\frac{5}{2} \Rightarrow 2x^2+2=5x$$

$$2x^2-5x+2=0$$

$$x=\frac{-(-5)\mp\sqrt{(-5)^2-4\times2\times2}}{2\times2}$$

$$=\frac{5\pm\sqrt{25-16}}{4}$$

$$=\frac{5\pm\sqrt{25-16}}{4}$$

$$=\frac{5\pm\sqrt{9}}{4}=\frac{5\pm3}{4}$$

$$x=\frac{5+3}{4}=\frac{8}{4}=2,\ x=\frac{5-3}{4}=\frac{2}{4}=\frac{1}{2}$$

x = 2 or $\frac{1}{2}$

Eg : 12) The product of two consecutive even numbers is 360.

a) If the odd number between these two numbers is x, write the even numbers

Ans : x - 1, x + 1

b) Write an equation for the given problem

(x +1) x (x - 1) = 360

x^2 - 1 = 360

x^2 = 361

x = $\sqrt{361}$

x = ±19

$\therefore$ The numbers are 18, and 20 , -18, and -20

Eg : 13) How many consecutive counting numbers starting from 1 are added to get 465?

$$1 + 2 + 3 + \ldots\ldots\ldots\ldots\ldots + n = \frac{n(n+1)}{2}$$

$$\frac{n(n+1)}{2} = 465$$

$$n(n+1) = 930 \Rightarrow n^2 + n - 930 = 0$$

$$n = \frac{-1 \pm \sqrt{1^2 - 4x930}}{2}$$
$$= \frac{-1 \pm \sqrt{3721}}{2}$$
$$n = \frac{-1 \pm 61}{2}$$
$$\therefore n = \frac{-1+61}{2} = \frac{60}{2} = 30$$

Ans : 30

Eg : 14) In the figure, AB is the diameter of the semi circle. AB is perpendicular to PC.

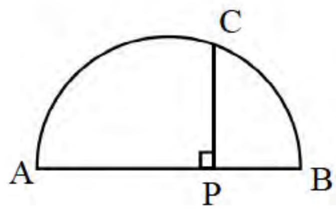
PB = PB + 12, PC = 8 cm

a) Write the relationship between PA, PB and PC.

b) If PB = x, form the equation

c) What is the length of PB

b) Calculate the radius of the circle.



PA x PB = PC^2

$(x + 12) \times x = 8^2$

$x^2 + 12x = 64$

$x^2 + 12x - 64 = 0$

$$x=\frac{-12\mp\sqrt{12^2+4\times1\times{}^{-}64}}{2}$$
$$=\frac{-12\pm\sqrt{144+256}}{2}$$
$$=\frac{-12\pm\sqrt{400}}{2}$$
$$x=\frac{-12+20}{2}$$
$$x=\frac{-12+20}{2}=\frac{8}{2}=4$$

$\therefore$ PB = 4 cm

PA = 12 + 4 = 16cm

AB = 20. Radius = 10 cm

15. Which are the solutions of the equation x^2 -2x-1 = 0

$$\left(1\pm\sqrt{2},\ 2\pm\sqrt{2},\ 3\pm\sqrt{3},\ 4\pm\sqrt{3}\right)$$

Ans : $1\mp\sqrt{2}$

16. Which are the solutions of the second degree equation

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

$$\left(\left(2,\frac{5}{3}\right),\left(-2,\frac{-5}{3}\right),\left(2,\frac{-5}{3}\right),\left(-1,\frac{5}{3}\right)\right)$$

Ans : $\left(2,\frac{-5}{3}\right)$

17. The solution of the equation $x^2 + 1 = 0$ is ....

(1, -1, 0, No solution)

Ans : No solution

18. In figure AB is the diameter and CD is a chord intesecting AB at P. AB = 16 cm; CD = 19 cm, PC = 4cm

a) If PA = x then find PB

b) Find length of PD

c) Find the length of PA

Ans : See answer key of Qn No. 4

19. 40m long wire is cut into two pieces. Each piece is bend to form squares. The sum of the area of these two squares is 58 m^2

a) If length of one piece is taken as x then find the length of other.

b) What is the length of the side of each square.

c) Form an equation with the given data

d) Find the length of each pieces.

Ans : See answer key of Qn No. 63

20. In the equation $x^2 + 10x = 24$,

a) What number should be added on both sides to make it a perfect square?

b) Find the values of 'x'

Ans : See answer key of Qn No. 70

21. Length of a rectangle is 2m more that its breadth. If the area of the rectangle is 224m^2

a) Take the breadth as x, find its length

b) Form a second degree equation with the given data

c) Find the perimeter of the rectangle.

Ans : See answer key of Qn No. 76

22. In a right triangle one of the perpendicular side is one less than two times the shortest side. Hypotenuse is one more that two times the shortest side.

a) Considering the shortest side as x, find the other two sides.

b) Find the sides of triangle

c) Find the area of the traingle.

Ans : See answer key of Qn No. 83

23. The length of a rectangle is 4 cm more than its breadth ; the area of that rectangle is $96cm^2$

a) If the breadth is 'x' find the length.

b) Find the length and breadth of the traingle.

Ans : See answer key of Qn No. 90

Chapter 5

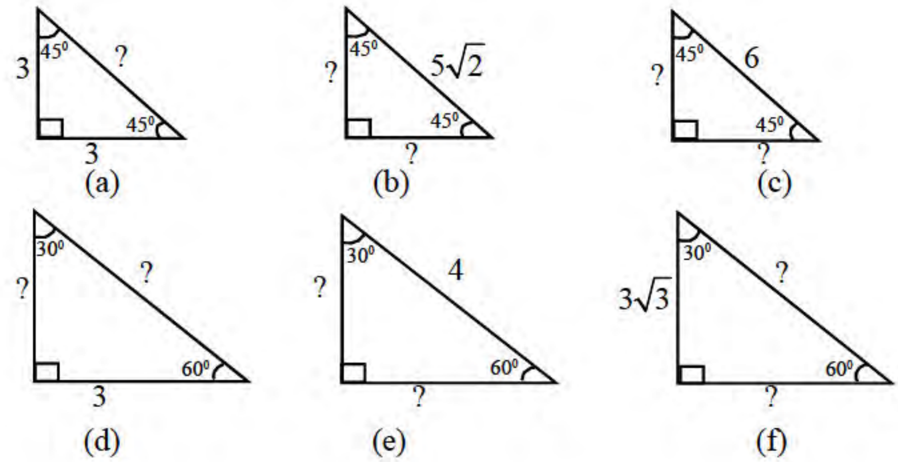
TRIGNOMETRY

★ The sides of any triangle of angles 45^0, 45^0, 90^0 are in the ratio $1 : 1 : \sqrt{2}$

★ In any triangle of angles 30^0, 60^0, 90^0 the sides are in the ratio $1 : \sqrt{3} : 2$

★ In any triangle of angles 30^0, 45^0, 105^0 the sides are in the ratio $\sqrt{2} : 2 : \sqrt{3}+1$

Eg : 1) Find the lengths of the missing sides in the triangle given below.



Answers

a) $3\sqrt{2}$

b) 5 , 5

c) $\frac{6}{\sqrt{2}}$ or $3\sqrt{2}$

d) $3\sqrt{3}, 6$

e) $2, 2\sqrt{3}$

f) 3, 6

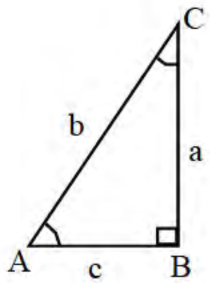
New measure of Angles

In the figure,

$$\text{Sin A}=\frac{\text{Opposite side}}{\text{Hypotenuse}}=\frac{a}{b}$$

$$\text{Cos A}=\frac{\text{Adjacent side}}{\text{Hypotenuse}}=\frac{c}{b}$$

$$\text{Tan A}=\frac{\text{Opposite side}}{\text{Adjacent side}}=\frac{a}{c}$$



Eg : 2) In ΔABC, $\angle B = 90^0$, AB = 6 cm, AC = 10 cm

a) What is the length of BC

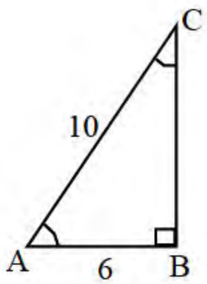
By Pythagoras Theory.........

$BC^2 = AC^2 - AB^2$

$= 10^2 - 6^2$

$= 100 - 36$

$BC^2 = 64 \Rightarrow BC = 8$ cm



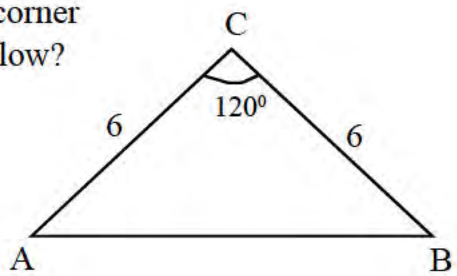
b) Find the value of SinA, CosA, TanA

$$\text{Sin A}=\frac{8}{10},\text{Cos A}=\frac{6}{10},\text{Tan A}=\frac{8}{6}$$

★ Sin, Cos, Tan measures of certain angles.

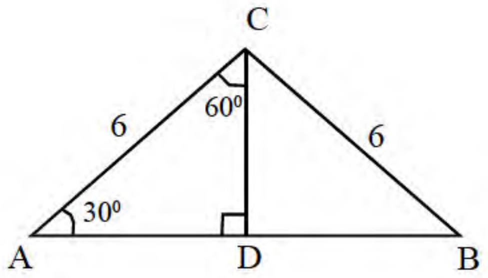
	30^0	45^0	60^0
Sin	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$
Cos	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$
Tan	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$

Eg : 3) What is the vertical distance from the top corner to the bottom side of the triangle goven below? What is the area of the triangle?



Answer : Draw CD $\perp$ AB. In right triangle ADC, the angles are 30^0, 60^0, 90^0.

$\therefore$ Ratio of sides = $1 : \sqrt{3} : 2$



$1 : \sqrt{3} : 2$

...... : ...... : 6

$3 : 3\sqrt{3} : 6$

$\therefore$ CD = 3 cm

Also AD = $3\sqrt{3}$, AB = $6\sqrt{3}$

Area of ΔABC = $\frac{1}{2}$xABxCD

$= \frac{1}{2} \times 6\sqrt{3} \times 3$

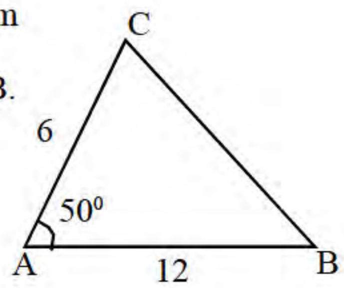
$= 3\sqrt{3} \times 3$

$= 9\sqrt{3}$ cm^2

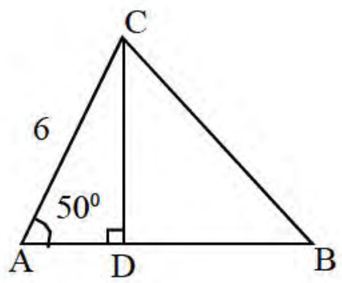
Eg : 4) In triangle ABC, AC = 6 cm, $\angle A = 50^0$, AB = 12 cm

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

b) Find the area of the ABC. (Sin 50^0 = 0.766)



Answer :



Draw CD $\perp$ AB. In right triangle ADC,

Sin A = $\frac{CD}{AC} \Rightarrow$ CD=AC x SinA

CD=6 x Sin50

CD = 6 x 0.766 = 4.59 cm

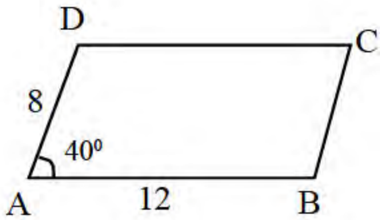
(b) Area of the $\Delta ABC = \frac{1}{2} \times AB \times CD$

$$= \frac{1}{2} \times 12 \times 4.59$$

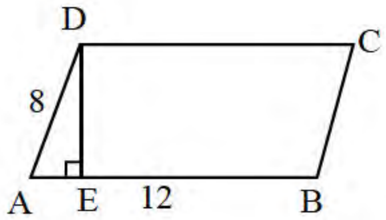
$$= 27.54 \text{ cm}^2$$

Eg : 5) Find the area of the parallelogram given below.

($\sin 40^0 = 0.6428$)



Answer :



Draw DE ⊥ AB. In right triangle AED,

$$\sin 40^0 = \frac{DE}{AD}$$

$DE = AD \times \sin 40 \quad = 8 \times 0.6428$

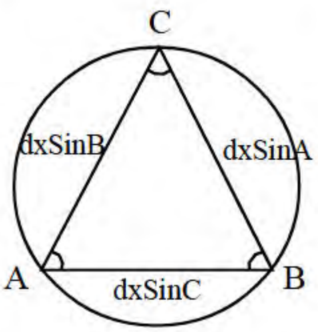
$= 5.1424$ cm

Area of the Parallelogram $=$ Base $\times$ Height

$= 12 \times 5.1424$

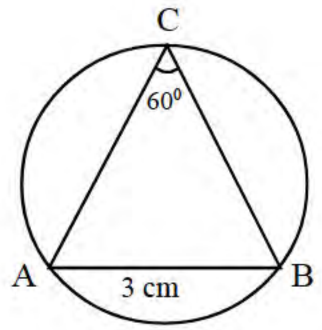
$= 61.7088 \text{ cm}^2$

Circum Radius of a Triangle



d is the diameter
of the circumcircle.

Eg : 6) A triangle and its circumcircle are shown in the figure. What is the radius of the circle?



$AB = d \times \text{Sin } 60$

$= 2r \times \text{Sin } 60$

$AB = 2r \times \frac{\sqrt{3}}{2}$

$2r = \frac{2xAB}{\sqrt{3}}$

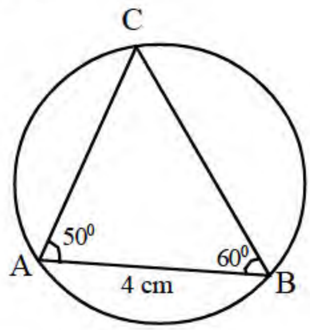
$2r = \frac{2x3}{\sqrt{3}} = 2\sqrt{3}$

$\therefore r = \sqrt{3}$ cm

Eg : 7) A triangle and its circum circle are shown in the figure.

a) Calculate the diameter of the circle.

b) Calculate the length of other sides of the triangle. ($\text{Sin } 70^0 = 0.9397$)



Answer :

a) $\angle C = 70^0$

$4 = d \times \text{Sin } 70^0$

$\therefore d = \frac{4}{\text{Sin } 70^0} = \frac{4}{0.9397}$

$\therefore d = 4.257$ cm

b) $AC = d \times \text{Sin } 60^0$

$= 4.257 \times 0.8660$

$AC = 3.687$ cm

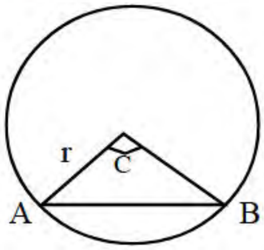
$BC = d \times \text{Sin } 50^0$

$= 4.257 \times 0.7660$

$BC = 3.261$ cm

Length of the chord in a circle

✶ If the diameter and the central angle of a chord are known, then length of the chord is the product of diameter length is the diameter multiplied and Sin of half the central angle.



Length of AB= d x Sin $\frac{C}{2}$, where d = 2r

Eg : 8) What is the length of the chord with a central angle of 120^0 in a circle of radius 4 cm?

Length of the chord $= 2r \times \text{Sin } \frac{120}{2}$

$= 2 \times 4 \times \text{Sin } 60$

$= 8 \times \frac{\sqrt{3}}{2}$

$= 4\sqrt{3}\text{cm}$

✶ If 'a' is the opposite side of ∠A, 'b' is the opposite side of ∠B, 'c' is the opposite side of ∠C in a triangle, then its area = $\frac{1}{2}$ ab Sin C= $\frac{1}{2}$ bc Sin A = $\frac{1}{2}$ ac Sin B

9) If two sides of a triangle are 10 cm, 5 cm and the angle between them is 50^0. Find the area of the triangle.

Area $= \frac{1}{2}$ ab Sin C

$= \frac{1}{2} \times 10 \times 15 \times \text{Sin } 50^0$

$= 5 \times 15 \times \text{Sin } 50^0$

$= 75 \times 0.7660$

$= 57.45 \text{ cm}^2$

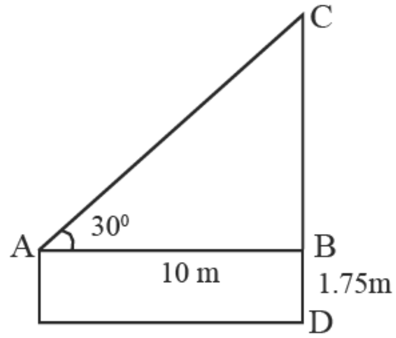
Angle of elevation and angle of depression

Angle of elevation : Angle between straight view and raised view.

Angle of depression : Angle between straight view and lawered view.

10. A child standing 10 m away from the base of a tree sees its top at an angle of 30^0. If the child is 1.75 m tall, what is the height of the tree?

$\text{Tan } 30^0 = \frac{BC}{10}$



BC = 10 x Tan 30

= 10 x 0.5774

BC = 5.774 m

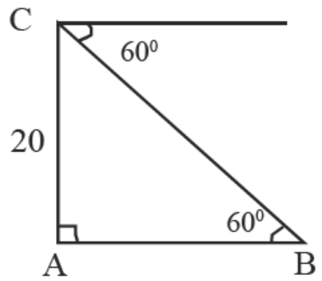
Height of the tree = CD

= CB + BD

= 5.774 + 1.75 = 7.524 m

11. A child looking down from the top of a 20 meter tall building, sees a car on the road below at an angle of 60^0. How far is the car from the building?
(tan 60^0 = = 1.73)

In $\angle ABC = 60^0$ ΔABC, $\tan 60^0 = \frac{20}{AB}$



$AB = \frac{20}{\tan 60} = \frac{20}{1.73}$

AB = 11.56m

Practice Questions

1. In the right angled traingle ABC $\angle B = 90^0$, $\text{SinA} = \frac{7}{25}$, then Cos C = ...

$\left(\frac{7}{25}, \frac{16}{25}, \frac{9}{25}, \frac{25}{7}\right)$

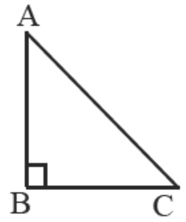
2. In $\triangle$ABC, Sin C $= \dfrac{AB}{BC}$ then CosC = ...

$\left(\dfrac{AB}{AC}, \dfrac{BC}{AB}, \dfrac{AC}{BC}, \dfrac{BC}{AC}\right)$

3. In traingle ABC $\angle B = 90^0$,

what is sin C = ...?

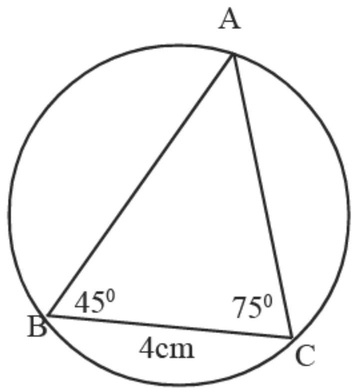
$(AB/BC, BC/AC, AB/AC, BC/AB)$



4. In figure BC=4 cm,

$\angle B = 45^0$, $\angle C = 75^0$

Find the circum radius of the $\triangle$ ABC.



5. In ΔABC if tan A $= \dfrac{3}{4}$ then find SinA, CosA.

6. In triangle PQR, $\angle Q = 90^0$, Sin $P = \dfrac{7}{25}$ Find Tan P.

7. From the top of an electric post, two wires are stretched to either side and fixed to the ground. For one wire it makes an angle of 45^0 with the ground and the distance to the foot of the post is 24 metres. For the second wire it makes an angle 30^0 with the ground.

a) Draw a rough figure

b) Find the height of the post

c) Find the total length of the wires

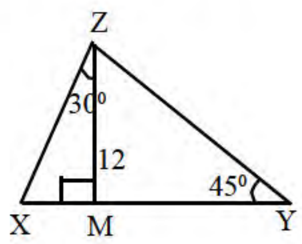
$\begin{pmatrix} \sqrt{2} = 1.414 \\ \sqrt{3} = 1.732 \end{pmatrix}$

8. Two building are 24 m apart. From the top of the smaller building , one sees the foot of the taller building at a depression of 60^0 and its top at an elevation of 30^0.

   a) Draw a rough figure

   b) Find the heights of both buildings.

9. In the figure MZ=12 cm, $\angle MZX = 30^0$



$\angle Y = 45^0$ and ZM is Perpendicular to XY

a) Find MX, XY

b) Find the perimeter of Δ XYZ

c) Find XZ : YZ : XY

Answers

1. $\frac{7}{25}$

2. $\frac{AC}{BC}$

3. $\frac{AB}{AC}$

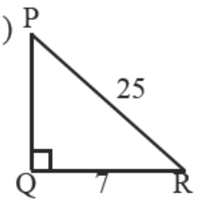
4. $\frac{a}{\text{Sin } A} = 2R \Rightarrow A = 60$

   a=4 $\quad \text{Sin } A = \frac{\sqrt{3}}{2} \qquad \frac{a}{\text{Sin } A} = \frac{4}{\frac{\sqrt{3}}{2}} = \frac{8}{\sqrt{3}}$

5. $\text{SinA} = \frac{3}{5}$

   $\text{CosA} = \frac{4}{5}$

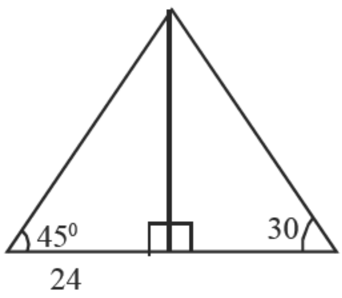
6. $PQ = \sqrt{25^2 - 7^2} = \sqrt{625 - 49}$ (1)



$= \sqrt{576} = 24cm$

$\tan P = \dfrac{7}{24}$

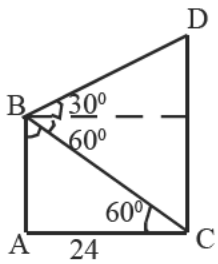
7. a)



b) 24 m

c) $48 + 24\sqrt{2}$

8.



Height of the small building = $24\sqrt{3}$

Height of taller building

$= \dfrac{24}{\sqrt{3}} + 24\sqrt{3}$

$= 8\sqrt{3} + 24\sqrt{3}$

$= 32\sqrt{3}$

9. a) $MX = \dfrac{12}{\sqrt{3}}, \; XY = \dfrac{12}{\sqrt{3}} + 12$

b) Perimeter = XY + YZ + ZX

$= \dfrac{24}{\sqrt{3}} + 12\sqrt{2} + \dfrac{12}{\sqrt{3}} + 12$

$\dfrac{36}{\sqrt{3}} + 12\sqrt{2} + 12$

c) $2 : \sqrt{6} \; : \; \sqrt{3} + 1$

Chapter - 6

CO - ORDINATES

✶ Points are marked in fixed positions with respect to the co - ordinates axes.

Eg : 1) Draw the X, Y axes and mark the points given below.

(3, 5), (2, -1), (1, -2), (2, 2), (0, 0)

✶ The y - coordinate of any point on the x - axis is zero.

✶ The x - coordinate of any point on the y - axis is zero.

Eg : 2) Draw x and y axes and mark the points given below.

(0, 5), (5, 0), (0, 4), (-2, 0)

Characteristics of the co-ordinates of points on lines parallel to the axes:

✶ x co-ordinate of the points on a line parallel to the y axis are equal.

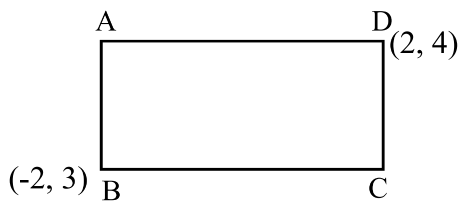
✶ y co-ordinate of the points on a line parallel to the x axis are equal.

Eg : 3) Separate and write the points on the line parallel to the x - axis and on the line parallel to the y - axis among the given points below.

(2, 5), (5, 6), (6, 5), (-2, 1), (2, -2), (2, 1), (-1, 5), (-2, 6), (-5, -2)

Eg : 4) Draw the xy axes and mark the points (3, 0), (8, 0), (11, 4), (6, 4) and join them together and give a suitable name to the resulting quadrilateral.

Eg : 5) Find the co-ordinates of the other two corners of the rectangle given below.



Ans : A=(-2, 4)
C=(2, 3)

Eg : 6) Without drawing the axes mark the points (3, 5), (7, 8) as the co-ordinates of the two opposite corners of the rectangle, and find the co-ordinates the other two corners.

✶ The distance between two points (x_1, y), (x_2, y) on a line parallel to the x -axis is $|x_2 - x_1|$

Eg : 7) What is the distance between the points (-5, 2) and (5, 2).

Ans : |-5-5|=|-25|=25

✶ The distance between two points (x, y_1), (x, y_2) on a line parallel to the z-axis is $|y_2 - y_1|$

Eg : 8) What is the distance between the points (7, 2) and (7, 8)?

Answer : |2-8|=|1-6|=6

✶ Distance between the points (x_1, y_1) and (x_2, y_2) is

d = $\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

Eg : 9) Find the distance between the points (5, 2) and (4, 8).

Answer : $\sqrt{(4-5)^2 + (8-2)^2} = \sqrt{(-1)^2 + 6^2} = \sqrt{1+36} = \sqrt{37}$

✶ Thedistance between the origin and the point where co-ordinates is (x, y)

d = $\sqrt{x^2 + y^2}$

Eg : 10) Calculate the distance from the origin to the point whose co-ordinates are (-2, 1).

Answer : $\sqrt{(-2)^2 + 1^2} + \sqrt{4+1} = \sqrt{5}$

Eg : 11) Prove that joining the points (2, 1), (3, 4), (-3, 6) forms a right triangle.

Practice Questions

1. Coordinates of a pair of opposite vertices of a rectangle with sides parrallel to the axes are (-2,3) and (5,6). Find the coordinates of the other vertices.

   Answer : (-2,6), (6,3)

2. Draw X and Y axes and mark the following points.

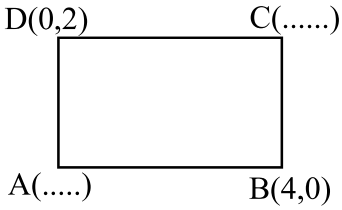
   a) A (0,5); B(0,-2); C(4,0); D(-3,0), E(4,5)

   b) Which is not a point on axes.

Answer : a) for drawing X, Y axes and marking the points.

b) E or (4,5)

3. Find the co-ordinates of other two vertices of the rectangle given below.



Answer : A (0,0) C(4,2)

4. a) Prove that the points (7,10,); (-2,5) and (3-4) are vertices of an isosceles right triangle.

b) Draw X and Y axes and mark the points A(1,1); B (4,1); C (4,4) and D (1,4) Join these points in order and give a suitable name for the figure so obtained.

Answer : a)) $AB = \sqrt{212}$

$BC = \sqrt{106}$

$AC = \sqrt{106}$

$AB^2 = BC^2 + AC^2$

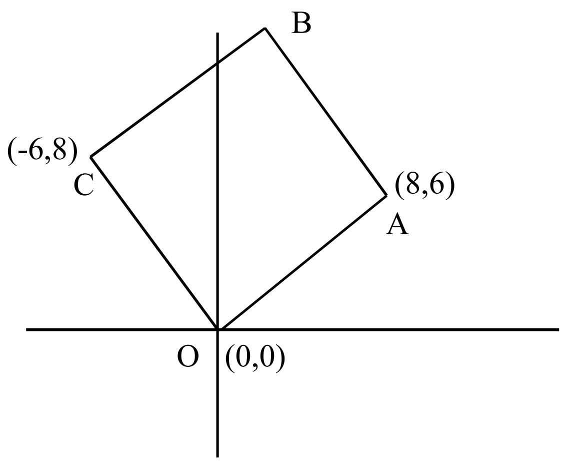
b) Square

5. In the figure the coodinates of 3 vertices of a square are given.

a) Find the coordinates of the fourth vertex

b) Find the length of its side

c) Find the area.



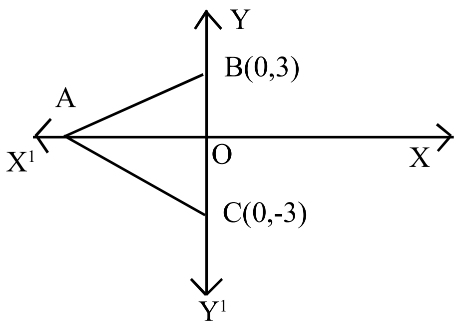
Answer :

a) (2,14)

b) $\sqrt{8^2 + 6^6}$ = 10 unit

c) 10 x 10 = 100 square unit

6. In the figure ΔABC is an equilateral one .



a) Find the length of one side of triangle ABC.

b) Find the perimeter of triangle ABC

c) Find the co-ordinates of A.

Answer :

a) 6cm

b) 18cm

c) A is $\left(-3\sqrt{3},0\right)$

Chapter - 7

TANGENTS

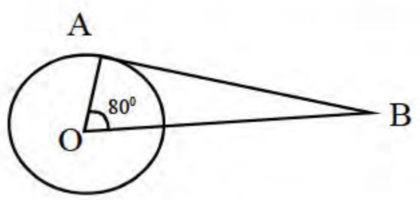
Definition : Tangent is line that touches only one point on the circle.

⇒ A tangent through a point on a circle is perpendicular to the radius through that point.

To draw a tangent through a point on a circle.

⇒ Construction : To draw a line through a point on a circle.

Eg : 1) AB is a tangent of circle with centre O, then find.



a) $\angle OAB$

b) $\angle B$

Ans : a) $\angle OAB = 90^0$

b) $\angle B = 180 - (90 + 80)$

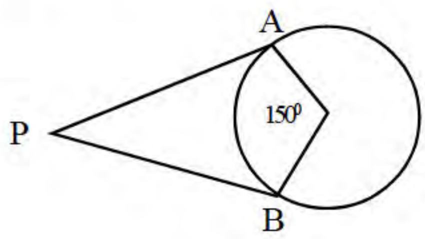
$= 180 - 170 = 10^0$

Eg : 2) Construction : Draw a circle of radius 3 cm. Mark a point A on the circle. Draw the tangent of circle through A.

✶ In a circle, the angle between the radii through two points and angle between the tangents at these points are supplementary.

✶ The quadrilateral with vertices at the centre of a circle, two points on it and the point where the tangents at there points meet, is cyclic.

Eg : 3) If the lines through points A, B on the circle with centre 'O' meet at P. Then find the following angles:



a) $\angle A$ b) $\angle B$ c) $\angle P$

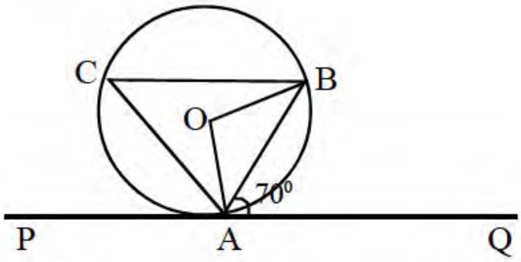
Ans : $\angle A = \angle B = 90^0$ c) $\angle P = 180 - 150 = 30^0$

Eg : 4) **Construction :** Draw a circle of radius 3 cm, Draw triangle of angles 80^0, 60^0 with all its sides touching the circle.

Chord and tangent

✶ In a circle, the angle between a chord and a tangent at either end is half the central angle of the chord.

Eg : 5) The angle made by the chord PQ and the tangent at A is 70^0. Then find the following angles:



a) $\angle AOB$

b) $\angle ACB$

Ans : a) $\angle AOB = 70 \times 2 = 140^0$

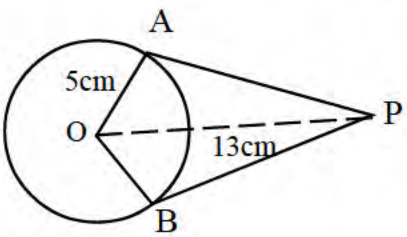
b) $\angle ACB = 70^0$

✶ **From a point outside a circle, two tangents can be drawn.**

✶ **The tangents to a circle from a point are of the same length.**

Construction : To draw a line from a points outside the circle.

Eg : 6) The radius of the circle is 5 cm and the distance from the centre to the point outside is 13 cm. Then find the length of the tangents.



Ans : $\angle A = \angle B = 90$ ΔOAP, ΔOBP right angled triangle.

$\therefore$ by Pythogaras theorem,

$PA^2 = 13^2 - 5^2$

$= 169 - 25$

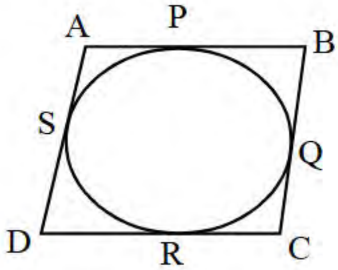
$= 144$

$\therefore$ The length of the tengents = 12 cm.

Eg : 7) **Construction** : Draw a circle of radius 2 cm. Mark a point 'P' 5 cm away from the centre. Draw tangents from P to the circle.

★ In a quadrilateral formed by the tangents at four points on a circle, the sum of the opposite sides are equal.

Eg : 8)



The sides AB, BC, CD and AD of quadrilateral ABCD touches the circle at P, Q, R and S respectively.

PA = 4 cm, AB = 5cm,
PB = 4+5 = 9cm

a) If AB + CD = 16 then find BC + AD

b) If AP = 4 cm, PB = 5 cm, DS = 7 cm, CR = 9 cm then find the perimeter of the quadrilateral ABCD.

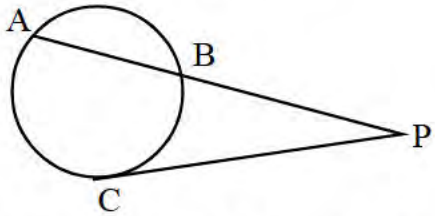
Ans : AB + CD = BC + AD

$\therefore$ BC + AD =16 cm

AP = 4 cm	$\therefore$ AS = 4 cm	AB = 4 + 5 = 9 cm
PB = 5 cm	$\therefore$ BQ = 5 cm	BC = 5 + 9 = 14 cm
DS = 7 cm	$\therefore$ DR = 7 cm	CD = 9 + 9 = 18 cm
CR = 9 cm	$\therefore$ CQ = 9 cm	AD = 4 + 5 = 9 cm

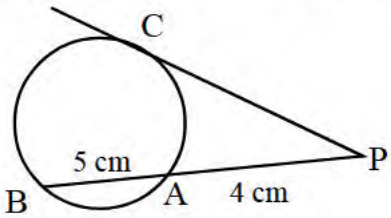
$\therefore$ Perimeter of the quadrilateral ABCD = 9 + 14 + 18 + 9 = 50 cm

★ The product of an intersecting line and the part of its outside the circle is equal to the square of the tangent.



$PA \times PB = PC^2$

Eg : 9) In the figure, PA = 4 cm, AB = 5 cm, then find the length of the tangents?



Ans : $PA \times PB = PC^2$

$4 \times 9 = PC^2$

$\therefore PC^2 = 36$

$\therefore PC = \sqrt{36} = 6$ cm

Length of the tangents = 6 cm

✶ The bisectors of all three angles of a triangle meet at a points.

Construction : To draw the incircle of a triangle.

Eg : 10) Draw a triangle of sides 5 cm, 6 cm, 7cm and draw its incircle. Measure the radius.

The radius of the incircle of a triangle is its area divided by half the perimeter.

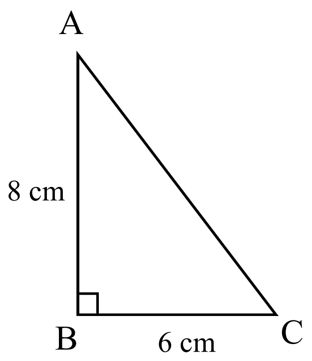
Inradius of triangle $r = \frac{A}{S}$

Eg : 11) The perpendicular sides of a right triangle are 6 cmand 8 cm. Then find

a) Its area and

b) the inradius of the triangle?

Ans :



$AC^2 = 8^2 + 6^2$

$= 64 + 36 = 100$

$AC = \sqrt{100} = 10$ cm

a) Area of the right angled triangle = $\frac{1}{2}$ bh

$= \frac{1}{2} \times 6 \times 8 = 6 \times 4 = 24$ cm

b) Perimeter of the triangle = 6 + 8 + 10 = 24

$\therefore s = \frac{24}{2} = 12$

Inradius of the triangle $= \frac{A}{S} = \frac{24}{12} = 2$ cm

Eg : 12) The sides of a triangle are 13 cm, 14 cm, 15 cm and its inradius is 4 cm. Then find its area.

$$s = \frac{13+14+15}{2} = \frac{42}{2} = 21$$

$\therefore$ Area of the triangle A = r x s

$= 4 \times 21$

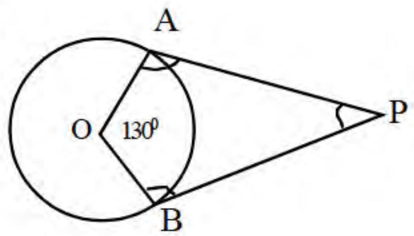
$= 84\ cm^2$

More Questions

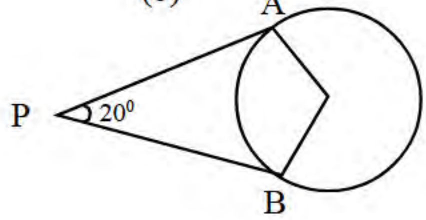
In the figures, PA and PB are the tangents through points A and B on the circle.

1. Find the measures of the other angles of the quadrilaterals, OAPB

(a)



(b)



(a) $\angle A = \angle B = 90^0$

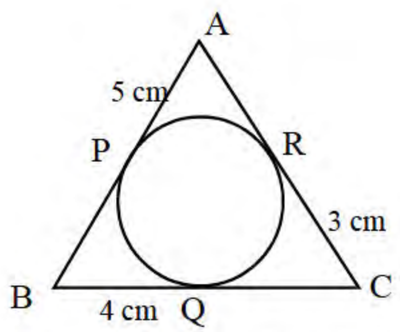
$\angle P = 180 - 130^0 = 50^0$

(b) $\angle A = \angle B = 90^0$

$\angle O = 180 - 20^0 = 160^0$

2. Draw a circle of radius 2 cm, draw triangles of angles 50^0, 60^0, 70^0 with all its sides touching the circle.

3.



In the figure, a circle touches the sides of the triangle at the point P, Q, R. If AP = 5 cm, BQ = 4 cm, CR = 3 cm

a) What is the length of AR?

Answer : AR=AP=5 cm

b) Calculate the length of BC

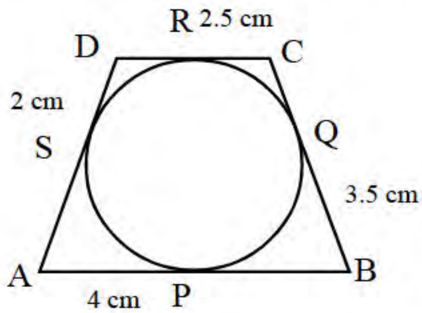
Answer : CQ=CR=3 cm

$\therefore$BC=4 cm+3 cm=7 cm

c) What is the perimeter of ΔABC.

Answer : Perimeter=AB+BC+AC=9+7+8=24 cm

4. The sides of quadrilateral ABCD touch the circle at the points P, Q, R and S.



a) Calculate the length of the sides of the quadrilateral ABCD

b) Calculate the perimeter of the quadrilateral ABCD.

Answer : (a) AB=7.5 cm, BC=6 cm, CD=4.5 cm, AD=6 cm. (b) Perimeter=24 cm

5. The radius of the incircle of a triangle whose sides are 5 cm, 6 cm, 7 cm is 2.5 cm.

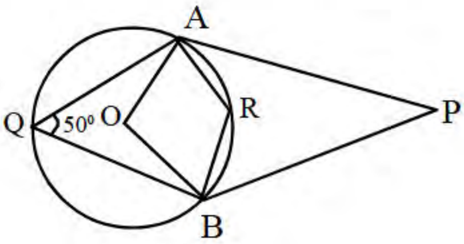
a) What is the perimeter of the triangle?

b) What is the area of the triangle?

Answer : (a) Perimeter = 18 cm

(b) Area=rxs=2.5 cm x 9 cm=22.5 cm^2

6.



Find the following angles.

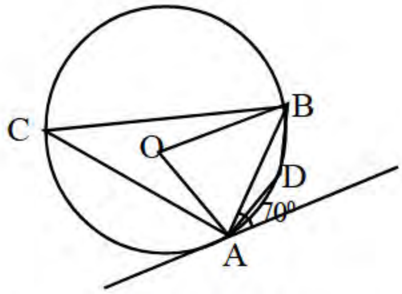
a) $\angle$AOB b) $\angle$ARB
c) $\angle$APB

Answer : a) $\angle$AOB=100^0

b) $\angle$ARB=130^0

c) $\angle$APB=80^0

7.



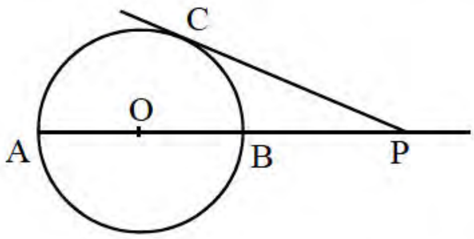
The chord AB and the tangent at A makes an angle 70^0. Find the angles given below.

a) $\angle ACB$ b) $\angle AOB$ c) $\angle ADB$

Answer : a) $\angle ACB=70^0$ b) $\angle AOB=140^0$ c) $\angle ADB=110^0$

8. Draw a circle of radius 3 cm and mark a point P at a distance of 6.5 cm from the centre. Draw tangent from P to the circle? Measure the length of the tangents.

9.



In the figure the diameter AB of the circle is extended to meet the tangent through C at P. If PC = 6 cm, PB = 3 cm then

a) What will be the length of PA?

b) Find the radius of the circle?

Answer : (a) $PA \times PB=PC^2$

$PA \times 3=6^2$

$PA=36=12$ cm

(b) $AB=PA-PB=12$ cm-3 cm$=9$ cm

$\therefore$ Radius $= 9/2=4.5$ cm

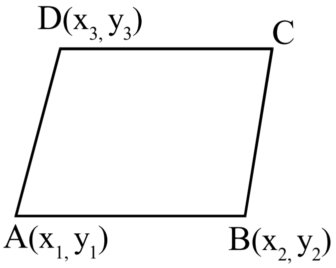
10. Draw a triangle with side AB = 7 cm and $\angle A = 60^0$, $\angle A = 50^0$, draw the incircle of the triangle and measure the inradius of the triangle.

Chapter : 9

GEOMETRY AND ALGEBRA

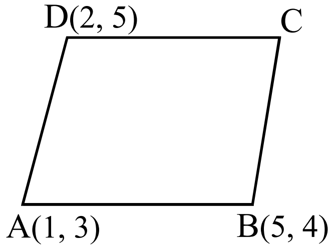
Finding the co-ordinates of the fourth corner of a parallelogram.

The co - ordinate of the point C of the parallelogram in the figure.



$C = (x_2 + x_3 - x_1, y_2 + y_3 - y_1)$

Eg : 1) What are the co-ordinates of the fourth corner of the parallelogram given below.



C $= (5 + 2 - 1, 4 + 5 - 3)$

$= (7 - 1, 9 - 3)$

C $= (6, 6)$

MID POINT

Co-ordinates of the mid point of the line joining the points (x_1, y_1) and (x_2, y_2) is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Eg : 2) What are the co-ordinates of the center of the circle whose diameter is draws through the points (4, 3) and (4, -3).

Centre = Mid Point of the diameter

$$= \left(\frac{4+4}{2}, \frac{3+(-3)}{2}\right)$$

$$= \left(\frac{8}{2}, \frac{0}{2}\right)$$

$= (4, 0)$

Eg : 3)A circle has its centre at (2, 1) and (-1, 0) is a point on it. Find the other end of the diameter through this point.

Other end of the diameter = (x, y)

$$\therefore \frac{x+(-1)}{2} = 2 \ , \ \frac{y+0}{2} = 1$$

$x = 4+1$, $y = 2$

$x = 5$

$\therefore$ Other end = (5, 2)

✶ The co-ordinates of the point which divide the line joining the points (x_1, y_1) and (x_2, y_2) in the ratio p : q,

x - co-ordinate = $x_1+\frac{p}{p+q}(x_2-x_1)$

y - co-ordinate = $y_1+\frac{p}{p+q}(y_2-y_1)$

Eg : 4) Find the co-ordinates of the point which discribes the line joining the points (2, 3) and (8, 6) in the ration 1 : 2.

$(x_1, y_1) = (2, 3)$, $(x_2, y_2) = (8, 6)$

p =1, q = 2

x - co-ordinate = $x_1+\frac{p}{p+q}(x_2-x_1)$

$= 2+\frac{1}{3}x(8 - 2)$

$= 2+\frac{6}{3}$

$= 2 + 2 = 4$

y - co-ordinate = $y_1+\frac{p}{p+q}(y_2-y_1)$

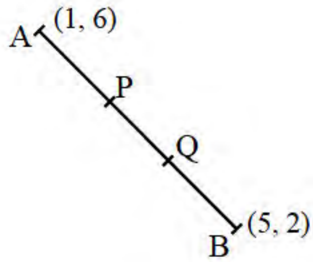
$= 3+\frac{1}{3}x(6 - 3)$

$=3+\frac{1}{3}x3$

$= 3 + 1 = 4$

The co-ordinates of the dividing point = (4, 4)

Eg : 5) Compute the co-ordinates of the points that make three equal parts of the line joining the points (1, 6) and (5, 2)



In the figure, point P divides the line joining (1, 6) and (5, 2) in the ratio 1 : 2 and point Q in the ratio 2 : 1.

$\therefore$ x - co-ordinate of $P = 1+\frac{1}{3}(5 - 1)$

$$=1+\frac{4}{3}$$

$$=\frac{7}{3}$$

y - co-ordinate of $P = 6+\frac{1}{3}(2 - 6)$

$$= 6+\frac{1}{3}\text{x-}4$$

$$= 6-\frac{4}{3}$$

$$= \frac{14}{3}$$

P is the point $\left(\frac{7}{3},\frac{14}{3}\right)$

x - co-ordinate of

$$Q=1+\frac{2}{3}\times(5-1)$$

$$=1+\frac{2}{3}\times 4 = 1+\frac{8}{3}=\frac{11}{3}$$

y - co-ordinate of

$$Q=6+\frac{2}{3}\times(2-6)$$

$$=6+\frac{2}{3}\times -4 = 6-\frac{8}{3}=\frac{10}{3}$$

$$\therefore Q\left(\frac{11}{3},\frac{10}{3}\right)$$

Slope of a line

★ The constant of proportionality of the change in co-ordinates of a line is a measure of the slant of the line. It is called the slope of the line.

The slope of the line joining the points (x_1, y_1) and (x_2, y_2) is

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

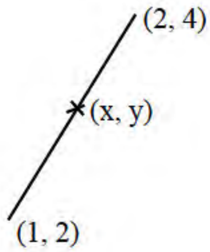
Eg : 6) Find the slope of the line joining the points (2, 4) and (5, 6)

$$\text{Slope} = \frac{6 - 4}{5 - 2} = \frac{2}{3}$$

Equation of a line

Eg : 7) Find the equation of the line joining the points (1, 2) and (2, 4).

$$\text{Slope of the line} = \frac{4 - 2}{2 - 1} = 2$$



Consider a point (x, y) on the line.

$$\therefore \frac{y - 2}{x - 1} = 2$$

$y - 2 = 2(x - 1)$

$y - 2 = 2x - 2$

$y - 2x = -2 + 2$

ie, $y - 2x = 0$

Equation of a circle :

★ The equation of a circle with centre at the origin and radius r is $x^2 + y^2 = r^2$

Eg : 8) Equation of a circle with centre at the origin and radius 3 is

$x^2 + y^2 = 3^2$

ie, $x^2 + y^2 = 9$

★ Equation of a circle with centre (h, k) and radius 'r' is,

$(x - h)^2 + (y - k)^2 = r^2$

Eg : 9) Find the equation of a circle with centre (5, 2) and passes through the point (9, 5).

$$\text{radius}, r = \sqrt{(9-5)^2 + (5-2)^2}$$
$$= \sqrt{4^2+3^2}$$
$$= \sqrt{25} = 5$$

$\therefore$ Equation of a circle is

$$(x-5)^2 + (y-2)^2 = 5^2$$

$$(x-5)^2 + (y-2)^2 = 25$$

$$x^2 - 10x + 25 + y^2 - 4y + 4 = 25$$

ie, $x^2 + y^2 - 10x - 4y + 4 = 0$

Eg : 10) Find a point on the x-axis which is equidistant from the points (-3, 2) and (4, 5).

Any point on x-axis can be taken as (x, 0).

The distance between (-3, 2), (x, 0) is equal to the distance between (4, 5) and (x, 0).

$$\Rightarrow (x+3)^2 + 4 = (x-4)^2 + 25$$
$$\Rightarrow x^2 + 6x + 9 + 4 = x^2 - 8x + 16 + 25$$
$$6x + 13 = -8x + 41$$
$$\therefore 14x = 28$$
$$x = \frac{28}{14} = 2$$

$\therefore$ The point is (2, 0)

Practice Questions

1. The slope of the line joining the points (3, 2), (8, k) is one. Find the value of K.

   (5, 6, 7, 8)

2. What are the coordinates of the centroid of the triangle with vertices (1,2), (2,3), (3,1)?

   $\left[(1,2),\ (2,2),\ (3,1),\ (1,3)\right]$

3. A circle is drawn with the line joining the points (7,-3) and (5,5) as diameter. Then the co-ordinates of the centre is

[(12,2); (2,12); (6,1); (1,6)]

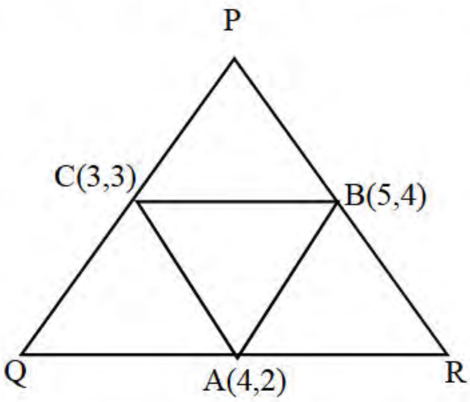
4. Equation of the circle is $x^2+y^2 = 25$. Then the centre of the circle is

[(5,5), (5,-5), (0,0), (-5,0)]

5. Find the slope of the line passing through the points (1,2) and (3,4)

(1, -1, 0, 2)

6. In figure A(4,2), B(5,4) and C(3,3) are the mid -points of the sides QR, PR and PQ of the traingle PQR respectively. Find the coordinates of the vertices of Δ PQR.



7. Consider the line joining the points (4,5) and (7,9)

a) Find the slope

b) Find two more points on the line

c) Check whether (2,2) a ponit on this line

d) Find the coordinate of the point of intersection of x axis and the line.

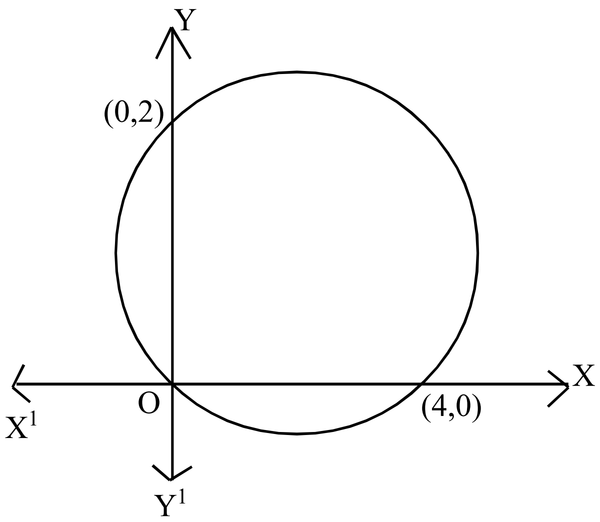
8. A(-2, -2), B(2, -2) , C(0,1) are vertices of triangle ABC.

a) Find the co-ordinates of the mid points of the sides of ΔABC

b) Prove that traingle ABC is an isosceles traingle.

9. a) Find the coordinates of the points which divides the line joining the points (1,2) and (7,5) into three equal parts.

   b) Find the equation of the circle in the given figure.



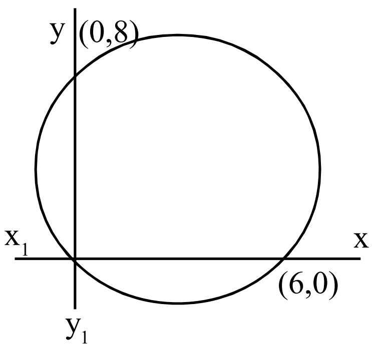
10. a) In the figure below find the coordinate of the centre of the circle.

   b) Find the radius.

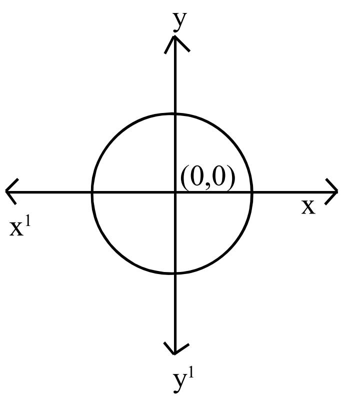
   c) Find the equation of the circle.

   d) Find the centre of the circle with equation.

   $x^2+4x+y^2 - 6y+12 = 0$



11. In the figure, the radius of the circle is 5 cm. Centre is the origin.



   a) Find the co-ordinates of the ponits of intersection of the circle with the X and Y axes.

   b) Write the equation of the circle.

   c) Find the Co-ordinates of any other two points on the circle.

Answers

1. 7
2. (2, 2)
3. (6, 1)
4. (0, 0)
5. 1
6. By considering the parallelograms QABC, ARBC, and ABPC

   P = (4,5) Q = (2,1) R=(6,3)

7. a) Slope = $\frac{4}{3}$

   b) (10, 13), (13, 17)

   c) $\frac{2-9}{2-7} = \frac{-7}{-5} = \frac{7}{5}$

   not a point.

   d) Point on x axis (x,0)

   Slope = $\frac{5-0}{4-x} = \frac{4}{3}$

   $$\frac{5}{4-x} = \frac{4}{3}$$
   $$15 = 16 - 4x$$
   $$4x = 16 - 15$$
   $$= 1$$
   $$x = 1/4$$

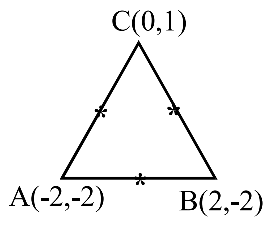
   point = $\left(\frac{1}{4}, 0\right)$

8. a) Mid-point of AB = $\left(\frac{-2+2}{2}, \frac{-2+-2}{2}\right)$

   = (0, -2)

   Mid-point of BC = $\left(\frac{2+0}{2}, \frac{-2+1}{2}\right)$

   $= (1, -1/2)$



$$\text{Mid-point of AC} = \left(\frac{-2+0}{2}, \frac{-2+1}{2}\right)$$

$$= (1, -1/2)$$

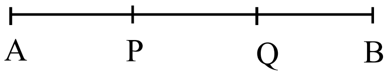
b) $AC^2 = 2^2 + 3^2 = 13$

$BC^2 = 2^2 + 3^2 = 13$

$\therefore$ AC = BC

$\therefore$ Isosceles

9. a)



AP : PB = 1:2

$\therefore$ P is (3,3)

PQ + QB - 1:1

Q is (5,4)

b) $(x-2)^2 + (y-1)^2 = 5$

10. a) (3, 4)

b) 5 unit

c) $(x-3)^2 + (y-4)^2 - 25$

d) (-2,3)

11. a) (5,0) (-5,0) (0,5) (0,-5)

b) $x^2+y^2 = 25$

c) (3,4) (-3,4)

Chapter 11

STATISTICS

✶ Mean = $\dfrac{\text{Sum of observation}}{\text{Number of observation}}$

✶ Median : Middle most observation when the observations are arranged in ascending or descending order.

If the number of observation = n

Median = $\left(\dfrac{n+1}{2}\right)^{th}$ observation if n is odd.

= Average of $\left(\dfrac{n}{2}\right)^{th}$ and $\left(\dfrac{n}{2}+1\right)^{th}$ observation if n is even.

Eg : Find mean and median of the following numbers.

4, 7, 3, 8, 2, 5, 9, 6, 2, 4

$$\text{Mean} = \frac{4+7+3+8+2+5+9+6+2+4}{10} = \frac{50}{10} = 5$$

Median : 2, 2, 3, 4, 4, 5, 6, 7, 8, 9

n = 10 (Even)

$\therefore$ Median = Average of $\left(\dfrac{10}{2}\right)^{th}$ and $\left(\dfrac{10}{2}+1\right)^{th}$ observation

= Average of 5^{m} and 6^{m} observation.

$$= \frac{4+5}{2} = \frac{9}{2} = 4.5$$

Median of frequency table :

Write the position upto each observation. Find the position of middle most observation and calculate the median.

Eg : Weight of the students in a class is tabulated as below. Find median weight.

Weight (kg)	Number of Students
35	6
37	3
38	2
39	4
40	7
42	3

Ans:

Weight (kg)	Number of Students
Upto 35	6
Upto 37	9
Upto 38	11
Upto 39	15
Upto 40	22
Upto 42	25

n = 25 (odd number)

Median = $\left(\frac{25+1}{2}\right)^{m} = \left(\frac{26}{2}\right)^{m}$ = 13^{m} observation

= 39 kg

Median from grouped frequency table :

Writting the position upto each upper limits of the class interval (cumulative frequency)

Writting the position of middle most observation.

Writing median class and dividing median class into equal parts as much as number of frequency and getting the approximate value of middle most observation.

Eg : Marks obtained by the students of class 10A are given below in table. Find the median mark.

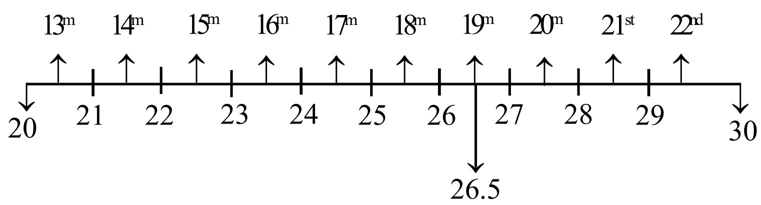
Mark	Number of Students
0 - 10	4
10 - 20	8
20 - 30	10
30 - 40	9
40 - 50	5

Ans :

Mark		Number of Students
0 - 10	Upto 10	4
10 - 20	Upto 10	12
20 - 30	Upto 10	22
30 - 40	Upto 10	31
40 - 50	Upto 10	37

n = 37 (odd number)

$$\therefore \text{ Median} = \left(\frac{35+1}{2}\right)^{m} = \left(\frac{38}{2}\right)^{m} = 19^{m} \text{ observation.}$$



$$d = \frac{30 - 20}{10} = \frac{10}{10} = 1$$

Mark of first student of median class $x_{13} = 20 + \frac{d}{2} = 20 + \frac{1}{2}$

$= 20.5$

Mark of 19^{m} student = x_{13} + 6d

= 20.5 + 6

= 26.5

More Questions

1. In an examination marks obtained by 11 students are given below.

   15, 35, 20, 18, 40, 32, 28, 50, 45, 27, 31

   a) Find the mean mark

   b) Find the median mark

2. Marks obtained by some students are given below. Find the median mark.

   66, 30, 56, 20, 13, 56, 53, 70, 50, 30, 56, 45, 56

3. The weights of 25 students are given below. Find the median weight.

Weight in Kgs	No. of students
35kg	4
40kg	5
50kg	6
55kg	6
60kg	2
65kg	2

4. If the median of the number 2, 5, 7, 10, 12, x, 17, 19, 21, 24 is 13.

   Find the value of x.

5. Find the mean and median of first 10 natural numbers.

6. The table below shows the ages of 100 people.

a)

Age	Number of people
0-10	5
10-20	15
20-30	20
30-40	25
40-50	15
50-60	11
60-70	9
Total	**100**

a) The age of the persons at what position is taken as the median.

b) What is the assumed age of 41^{th} person?

c) Find the median age.

7. In a locality the house are classified according to the consumption of electricity.

Consumption of Electricity	Number of House
0-60	4
60-120	10
120-180	12
180-240	15
240-300	14
300-360	4

a) Find the total number of houses

b) According to the hypothesis what is the consumption of electricity of 27^{th} house.

c) Find the median

8. The details of income tax given by the teachers of a school is given below.

a)

Income tax in rupees	**Number of Teachers**
30,000 - 40,000	4
40,000 - 50,000	6
50,000 - 60,000	5
60,000 - 70,000	4
70,000 - 80,000	4

a) The income tax of the teachers at what position is taken as the median ?

b) What is the assumed income tax of 11^{th} teacher?

c) Find the median tax.

9. (a) Find median of the first 10 odd numbers.

(b) Find median and mean of the first 10 even numbers.

10. Below is the list of children in a class sorted according to their height.

Height (cm)	Number of Children
145 - 150	6
150 - 155	12
155 - 160	2
160 - 165	5
165 - 170	11
170 - 175	9

If the children are placed in order of height

(a) What is the position of the child who has median height.

(b) What is the estimated height of the 21^{st} student.

(c) Calculate the median height.

Answers :

1) a) Mean = 31

b) Median = 31

2) Arranging in ascending or descending order

13, 20, 30, 30, 45, 50, 53, 56, 56, 56, 56, 66, 70

Median = 53

3) Median Weight = $\frac{25+1}{2}$ = Weight of 13^{th} student = 50kg

4) n=10

Median = Average y 5th and 6th number

$$= \frac{12+x}{2}$$

Given median = 13

$$= \frac{12+x}{2} = 13$$

$12+x = 26$

$x=26-12=14$

5) Mean = $\frac{1+2+3+....10}{10} = \frac{55}{10} = 5.5$

Median = Average of 5^{th} and 6^{th} number $= \frac{5+6}{2} = 5.5$

6)

	Age	Number
	below 10	5
	below 20	20
10	below 30	40
	below 40	65
	below 50	80
	below 60	91
	below 70	100

a) 50, 51

b) $30+\frac{5}{25}=30.2$

c) $\text{Median}=\frac{50^{th}+51^{st}}{2}$

$$=30\frac{100}{25}$$
$$=30+4=34$$

7)

60	4
120	14
180	26
240	41
300	55
360	59

a) 59
b) 182
c) 194

8) a) $\frac{23+1}{2}$ = Tax of 12^{th} teacher

b) Assumed tax for 11^{th} teacher.

$$d = \frac{10000}{5} = 2000$$

$$= 50000 + d/2$$

$$= 50000 + 1000$$
$$= 51000$$

c) Median Tax = 51000+2000

53,000

9) (a) 10, (b) Mean = Median = 11

10) (a) 23, (b) 160.5, (c) 162.5

* * *

EQUIP - 2024

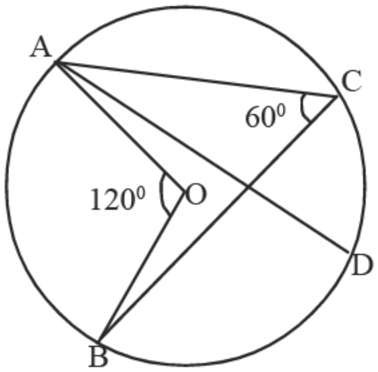
SSLC - EXAMINATION SUPPORT MATERIAL

MATHEMATICS - ENGLISH MEDIUM

<u>1 Mark Questions</u>

1. Which is the fifth term of the arithmetic sequence 11, 15, 19, 23, ...

   (25, 26, 27, 28)

2. 

   In figure $\angle AOB = 120^0$

   $\angle ACB = 60^0$

   Find $\angle ADB$

   (30^0, 60^0, 120^0, 240^0)

3. Numbers from 1 to 25 are written in small papers and placed in a box. A paper is taken at random, without looking. Find the probability of getting an even number.

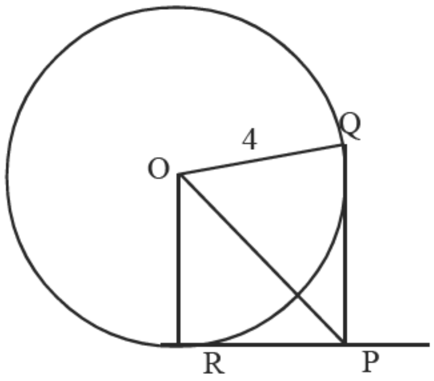
   $\left(\frac{13}{25}, \frac{12}{25}, \frac{9}{25}, \frac{11}{25}\right)$

4. In the right angled traingle ABC $\angle B = 90^0$, $\text{Sin}A = \frac{7}{25}$, then Cos C = ...

   $\left(\frac{7}{25}, \frac{16}{25}, \frac{9}{25}, \frac{25}{7}\right)$

5. In the figure PQ and PR are tangents through Q and R of the circle with centre O, If radius = 4 cm, $\angle QPR = 90^0$ then the length of PQ............

   (3, 4, 5, 6)

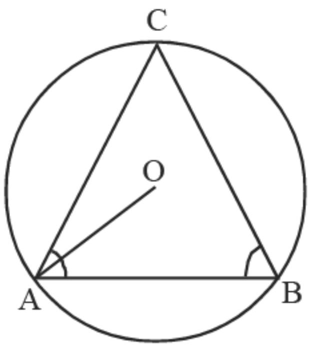


6. The slope of the line joining the points (3, 2), (8, k) is one. Find the value of K.

   (5, 6, 7, 8)

7. In the figure 'O' is the centre and A,B,C are points on the circle.

   $\angle OAC + \angle ABC =$ ....



   $(45^0,\ 60^0,\ 90^0,\ 180^0)$

8. Which are the two numbers whose sum is 4 and product is 2.

   $\left(2+\sqrt{2},\ 2-\sqrt{2}\right)$, $\left(-2+\sqrt{2},\ 2-\sqrt{2}\right)$,
   $\left(2+\sqrt{2},\ -2-\sqrt{2}\right)$, $\left(2+\sqrt{2},\ 2+\sqrt{2}\right)$

9. What are the coordinates of the centroid of the triangle with vertices (1,2), (2,3), (3,1)?

   [(1,2), (2,2), (3,1), (1,3)]

10. Which are the solutions of the equation $x^2 -2x-1 = 0$

    $\left(1\pm\sqrt{2},\ 2\pm\sqrt{2},\ 3\pm\sqrt{3},\ 4\pm\sqrt{3}\right)$

11. Find the 19th term of the arithmatic sequence 18,17,16............

(1, -1, 0, 36)

12. Name the quadrilateral for which we can always draw incircle

(Parallelogram, rectangle, trapezium, rhombus)

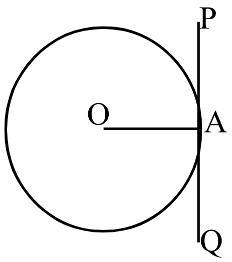
13. Letters of the word 'EXAMINATION' are written on different paper slip and put it in a box. One slip is taken at random. What is the probability of getting the letter 'A'?

$(\frac{1}{11}, \frac{1}{10}, \frac{2}{11}, \frac{2}{10})$

14. In $\triangle ABC$, Sin C $= \frac{AB}{BC}$ then CosC = ...

$\left(\frac{AB}{AC}, \frac{BC}{AB}, \frac{AC}{BC}, \frac{BC}{AC}\right)$

15. In the fig. O is the centre of the circle and PQ is a tangent. Then which may be a measure of $\angle OPA$?



$(60^0, 100^0, 90^0, 120^0)$

16. A circle is drawn with the line joining the points (7,-3) and (5,5) as diameter. Then the co-ordinates of the centre is

[(12,2); (2,12); (6,1); (1,6)]

17. Which are the solutions of the second degree equation

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

$\left(\left(2, \frac{5}{3}\right), \left(-2, \frac{-5}{3}\right), \left(2, \frac{-5}{3}\right), \left(-1, \frac{5}{3}\right)\right)$

18. Equation of the circle is $x^2+y^2 = 25$. Then the centre of the circle is

[(5,5), (5,-5), (0,0), (-5,0)]

19. Slant height and height of a square pyramid are10 cm and 6 cm respectively. Find the length of its base edge.

(16 cm, 8 cm, 4 cm, 2 cm)

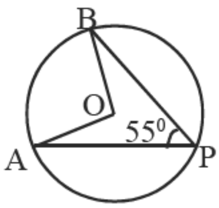
20. Which of the following is a factor of the polynomial x^2-5x+6.

[(x-1), (x+2), (x-3), (x+3)

21. The algebraic form of an arithmetic sequence is 4n-3. What is the common difference ?

(4,-4,3,-3)

22.



In the figure O is the centre of the circle.

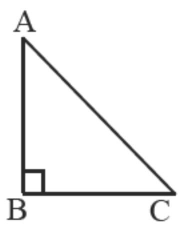
If $\angle APB = 55^0$, What is $\angle AOB$

(55^0, 110^0, 125^0, $22\frac{1}{2}^0$)

23. In a box, there are 10 slips numbered 1,2,3........10. If one slip is taken from the box, what is the probability of getting a prime number ?

($5/10$, $4/10$, $3/10$, $6/10$)

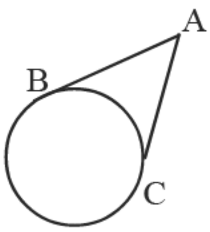
24. In traingle ABC $\angle B = 90^0$,



what is sin C = ...?

(AB/BC, BC/AC, AB/AC, BC/AB)

25.



In the figure, AB and AC are tangens to the circle.

If AB = 5cm What is AC ?

$\left(5\sqrt{2}cm,\ 5\sqrt{3}cm,\ 5cm,\ \frac{5}{2}cm\right)$

26. Find the slope of the line passing through the points (1,2) and (3,4)

(1, -1, 0, 2)

27. The solution of the equation $x^2 + 1 = 0$ is ....

(1, -1, 0, No solution)

28. The slant height of a square pyramid is 10 cm and its height is 8 cm. Find the base edge.

(6, 12, 10, $10\sqrt{2}$)

29. A sector of radius 16 cm and central angle 120^0 is rolled up into a cone. What is the slant height of the cone.

(8, 10, 16, $16\sqrt{3}$)

30 In the polynomial $P(x) = x^3-1$, $P(1) = 0$ write one factor of this polynomial

(x+1 x-1, x+2, x-2)

2 Mark Questions

31. a) If 5^{th} term and 8^{th} term of an arithmetic sequence are 16 and 25 respectively then find the common difference.

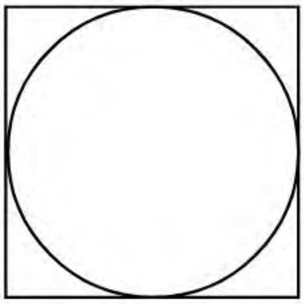
b) Find the difference between 10^{th} and 20^{th} terms

32. In figure 'O' is the centre and A,B,C are points on the circle.

a) Find the measure of $\angle A$

b) In ΔBOC, Find $\angle OBC$.

33. In figure circle exactly fitting inside a square. Calculate the probability of a dot put without looking to be within the circle.



34. Coordinates of a pair of opposite vertices of a rectangle with sides parralle l to the axes are (-2,3) and (5,6). Find the coordinates of the other vertices.

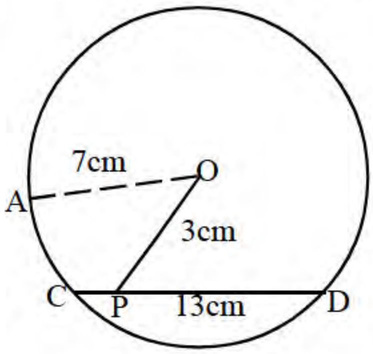
35. In an examination marks obtained by 11 students are given below.

15, 35, 20, 18, 40, 32, 28, 50, 45, 27, 31

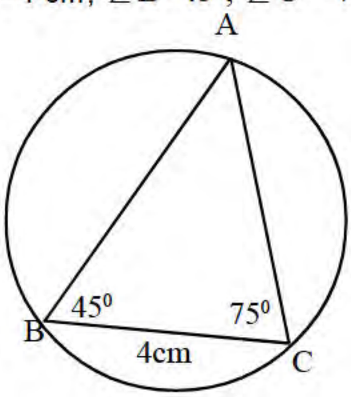
a) Find the mean mark

b) Find the median mark

36. In figure 'O' is the centre of the circle and a line from the centre intersect the chord. Find the length of each part of the chord.



37. In figure BC=4 cm, $\angle B=45^0$, $\angle C = 75^0$ Find the circum radius of the $\triangle$ ABC.



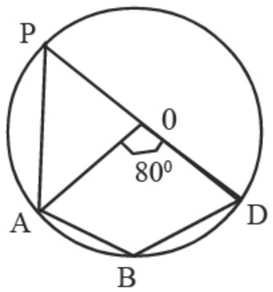
38. The perpendicular sides of a right angled triangle are 9 cm and 12 cm. Find the inradius of the triangle.

39. n^{th} term of an arithmetic sequence is given by 3n-4.

a) Find the common difference

b) Find the 10^{th} term

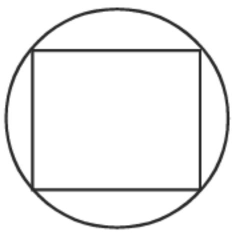
40. In figure 'O' is the centre and $\angle AOD = 80^0$



a) Find $\angle APD$

b) Find $\angle ABD$

41. A dot is put inside the circle without looking into it. Find the probability that the dot is inside the square.



42. Draw X and Y axes and mark the following points.

a) A (0,5); B(0,-2); C(4,0); D(-3,0), E(4,5)

b) Which is not a point on axes.

43. Marks obtained by some students are given below. Find the median mark.

66, 30, 56, 20, 13, 56, 53, 70, 50, 30, 56, 45, 56

44. In ΔABC if $\tan A = \frac{3}{4}$ then find SinA, CosA.

45. Find the inradius of an equilateral triangle of side 10 cm.

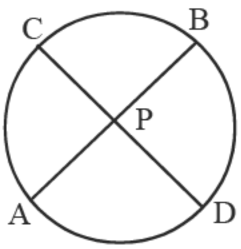
46. Base perimeter and slant height of a square pyramid are 48 cm and 10 cm respectively.

a) Find the height of the pyramid

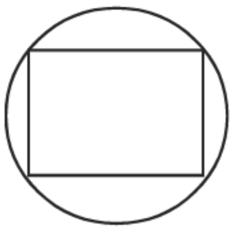
b) Find the volume.

47. a) Write the algebraic form of the arithmetic sequence 1,6,11...........

b) Find the 15th term of this sequence

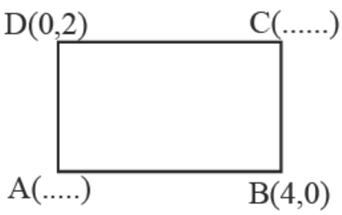
48. 

In the figure PA = 4cm, PB = 6cm, PC = 2cm, Find PD.

49. 

A dot is put inside the circle, without looking. What is the probability that the dot is outside the square.

50. Find the co-ordinates of other two vertices of the rectangle given below.



51. The weights of 25 students are given below. Find the median weight.

Weight in Kgs	No. of students
35kg	4
40kg	5
50kg	6
55kg	6
60kg	2
65kg	2

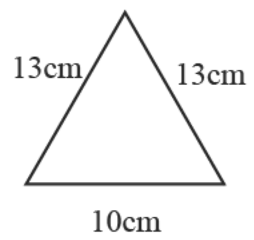
52. In triangle PQR, $\angle Q = 90^0$, $\text{Sin } P = \frac{7}{25}$ Find Tan P.

53. The perimeter of a traingle is 20 cm and radius of the incircle is 3 cm, find the area of the traingle.

54. The measures of one lateral face of a square pyramid are given below.

a) Find the sum of all edges of the Square pyramid

b) Find the slant height.



3 Mark Questions

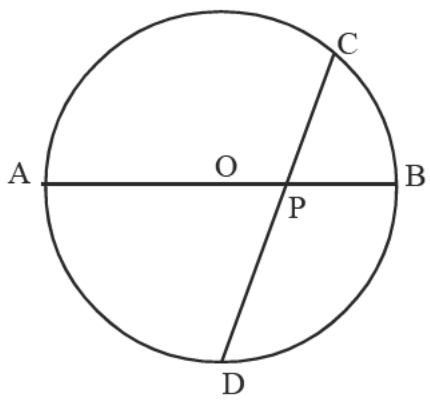
55. Draw a rectangle of side 6 cm and 3 cm. Construct a square of equal area of the rectangle.

56. In figure AB is the diameter and CD is a chord intesecting AB at P. AB = 16 cm; CD = 19 cm, PC = 4cm

a) If PA = x then find PB

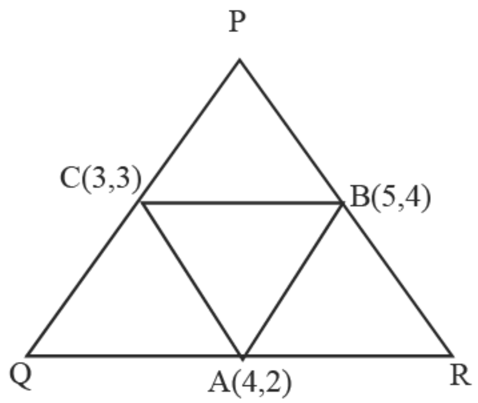
b) Find length of PD

c) Find the length of PA



57. Draw a circle of radius 3.5 cm. Mark a point at a distance 7 cm from the centre of the circle. Draw tangents from this point to the circle. Measure the length of the tangents.

58. In figure A(4,2), B(5,4) and C(3,3) are the mid -points of the sides QR, PR and PQ of the traingle PQR respectively. Find the coordinates of the vertices of Δ PQR.



59. a) $P(x) = x^2-7x+6$ Find P(1), P(6)

b) Find the solution of the equation P(x) = O

c) Write a polynomial with P(1) = 0, P(2) = 0, P(3) = 0

60. Sum of first n terms of an arithmetic sequence is $3n^2+2n$.

Find,

a) Common difference

b) prove that if 9 is added to the sum of first certain terms of the arithmetic sequence 16, 24, 32, 40, ... then it is a perfect square.

61. Two dice with faces numbered from 1 to 6 are rolled together.

a) What are the possible sums?

b) Which of these sums has the maximum probability?

62. Draw a rectangle of sides 4 cm and 3 cm. Construct a square of equal area.

63. 40m long wire is cut into two pieces. Each piece is bend to form squares. The sum of the area of these two squares is 58 m^2

a) If length of one piece is taken as x then find the length of other.

b) What is the length of the side of each square.

c) Form an equation with the given data

d) Find the length of each pieces.

64. Draw a circle of radius 3 cm. Draw a triangle in which sides are tangent to the circle with two of its angle 50^0 and 60^0 .

4 Mark Questions

65. Consider the line joining the points (4,5) and (7,9)

a) Find the slope

b) Find two more points on the line

c) Check whether (2,2) a ponit on this line

d) Find the coordinate of the point of intersection of x axis and the line.

66. a) If $P(x) = x^2-5x+k$ $P(2) = 0$ then find the value of K

b) find the value of P(3), P(4)

c) Check whether (x-3) is a factor of P(x)

67. Sum of n terms of an arithmetic sequence is $3n^2+2n$

a) Find the first term

b) Find the common diffrence

c) Write the sequence

d) Find the sum of first 10 term of the arithmetic sequence 7,13,19.........

68. In class 10 A, there are 30 boys and 20 girls. In 10 B, there are 20 boys and 15 girls. One student is to be selected from each class.

a) How many ways selection can be done

b) What is the probability of both being boys

c) What is the probability of both being girls

d) What is the probability of one girl and one boy.

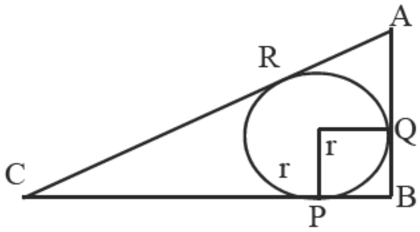
69. Draw a rectangle with sides 5 c.m., 3 cm. construct a square of equal area.

70. In the equation $x^2 + 10x = 24$,

a) What number should be added on both sides to make it a perfect square?

b) Find the values of 'x'

71. In a right traingle ABC, right angled at B, BC=12 cm, AB =5cm, What is the radius of the circle inscribed in the traingle.



72. A(-2, -2), B(2, -2) , C(0,1) are vertices of triangle ABC.

a) Find the co-ordinates of the mid points of the sides of ΔABC

b) Prove that traingle ABC is an isosceles traingle.

73. Draw a circle of radius 2.5 cm. Then draw a rhombus of one angle 70^0 with all its sides touching the circle.

74. The sum of n terms to an arithmetic sequnce is $4n^2$-3n.

Find,

a) The first term

b) Find the common difference

c) Find the n^{th} term

75. In a box there are 3 black and 7 white balls. In another box, there are 4 black and 6 white balls. If One ball is taken from each box without looking into it.

Find the probability that,

a) both being black

b) both being white

c) Atlest one ball is black

5 Mark Questions

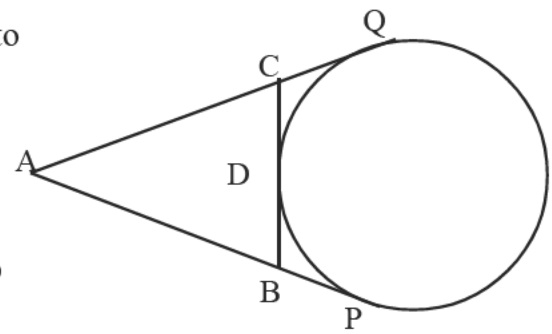
76. Length of a rectangle is 2m more that its breadth. If the area of the rectangle is $224m^2$

a) Take the breadth as x, find its length

b) Form a second degree equation with the given data

c) Find the perimeter of the rectangle.

77. a) In the figure AP, AQ, BC are tangents to the circle. If AP = 12 cm then find the perimeter of ΔABC



b) Draw a circle of radius 2.5cm.

Draw a triangle of angles $40^0, 60^0, 80^0$ with all its sides touching the circle.

78. From the top of an electric post, two wires are stretched to either side and fixed to the ground. For one wire it makes an angle of 45^0 with the ground and the distance to the foot of the post is 24 metres. For the second wire it makes an angle 30^0 with the ground.

a) Draw a rough figure

b) Find the height of the post

c) Find the total length of the wires

$$\begin{pmatrix} \sqrt{2} = 1.414 \\ \sqrt{3} = 1.732 \end{pmatrix}$$

79. a) Prove that the points (7,10,); (-2,5) and (3-4) are vertices of an isosceles right triangle.

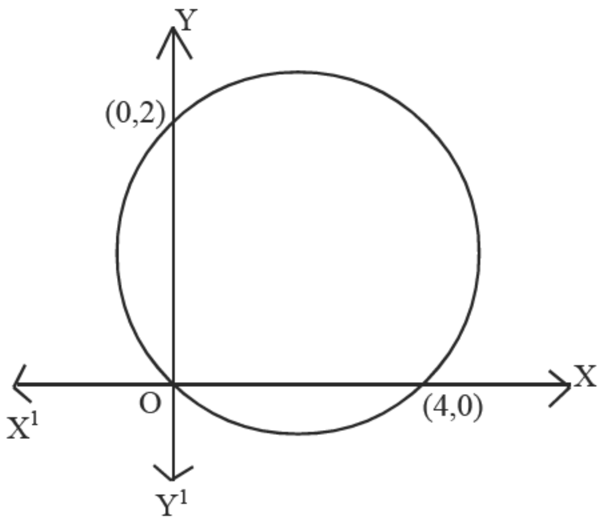
b) Draw X and Y axes and mark the points A(1,1); B (4,1); C (4,4) and D (1,4) Join these points in order and give a suitable name for the figure so obtained.

80. a) A square pyramid of base edge 10 cm and height 12 cm is to be made of paper. What should be the dimensions of the traingles.

b) The height of a square pyramid with all its edges are equal is 12 cm. Find its volume.

81. a) Find the coordinates of the points which divides the line joining the points (1,2) and (7,5) into three equal parts.

b) Find the equation of the circle in the given figure.



82. The table below shows the ages of 100 people.

a)

Age	Number of people
0-10	5
10-20	15
20-30	20
30-40	25
40-50	15
50-60	11
60-70	9
Total	**100**

a) The age of the persons at what position is taken as the median.

b) What is the assumed age of 41^{th} person?

c) Find the median age.

83. In a right triangle one of the perpendicular side is one less than two times the shortest

side. Hypotenuse is one more that two times the shortest side.

a) Considering the shortest side as x, find the other two sides.

b) Find the sides of triangle

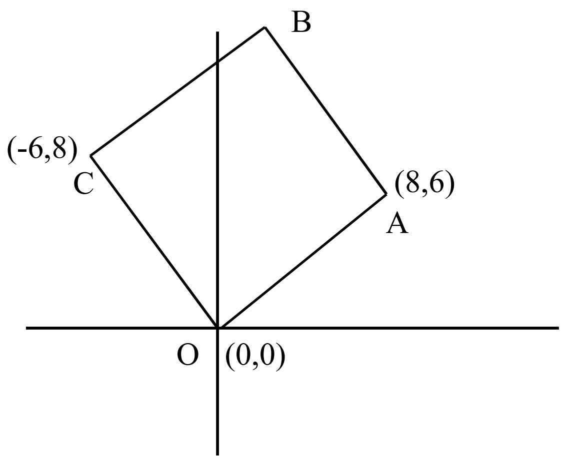
c) Find the area of the traingle.

84. Two building are 24 m apart. From the top of the smaller building , one sees the foot of the taller building at a depression of 60^0 and its top at an elevation of $30^{0.}$

a) Draw a rough figure

b) Find the heights of both buildings.

85. In the figure the coodinates of 3 vertices of a square are given.



a) Find the coordinates of the fourth vertex

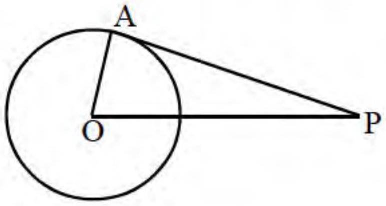
b) Find the length of its side

c) Find the area.

86. a) In figure O is the centre of the circle and PA is a tangent.

If PA = 5 cm and OP = 4cm then find the radius of the circle.

b) Draw a circle of radius 3 cm. Draw tangent from a point which is at a distance of 4 cm away from the centre of the circle. Measure the length of the tangent.



87. Draw a rectangle of sides 6 cm and 4 cm. Draw another rectangle with one side 7 cm and area equal to that of the first rectangle.

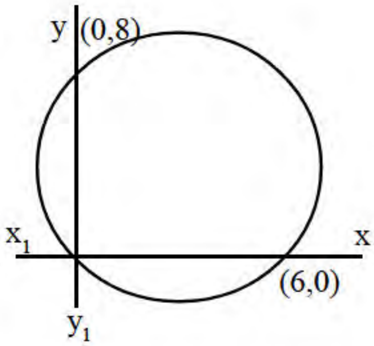
88. a) In the figure below find the coordinate of the centre of the circle.

b) Find the radius.

c) Find the equation of the circle.

d) Find the centre of the circle with equation.

$x^2+4x+y^2-6y+12=0$



89. In a locality the house are classified according to the consumption of electricity.

Consumption of Electricity	Number of House
0-60	4
60-120	10
120-180	12
180-240	15
240-300	14
300-360	4

a) Find the total number of houses

b) According to the hypothesis what is the consumption of electricity of 27^{th} house.

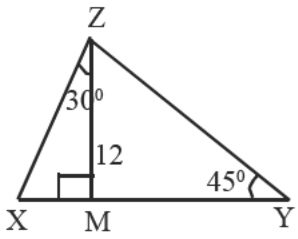
c) Find the median

90. The length of a rectangle is 4 cm more than its breadth ; the area of that rectangle is $96cm^2$

a) If the breadth is 'x' find the length.

b) Find the length and breadth of the traingle.

91.



In the figure MZ=12 cm, MZX $=30^0$

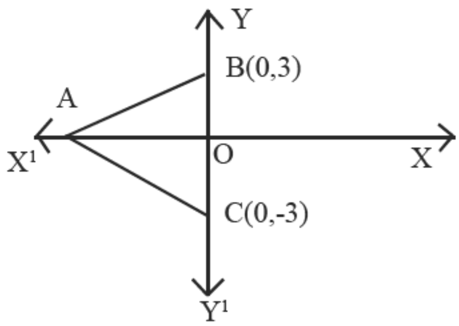
$\angle Y=45^0$ and ZM is Perpendicular to XY

a) Find MX, XY

b) Find the perimeter of Δ XYZ

c) Find XZ : YZ : XY

92. In the figure ΔABC is an equilateral one .



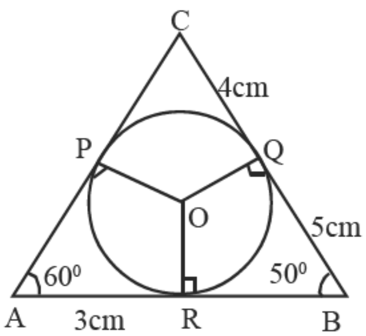
a) Find the length of one side of triangle ABC.

b) Find the perimeter of triangle ABC

c) Find the co-ordinates of A.

93. In triangle ABC $\angle A = 60^0$, $\angle B = 50^0$, AR = 3cm,

CQ = 4cm, BQ = 5cm



a) Find the perimeter of ΔABC

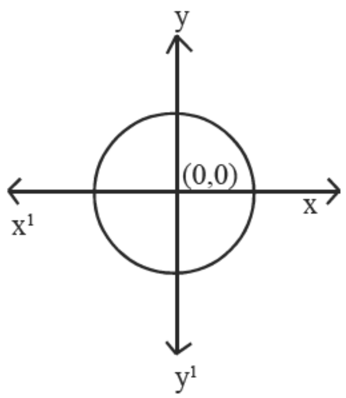
b) Find $\angle POR$, $\angle POQ$

c) Find $\angle RPQ$, $\angle BRQ$

94. Draw a rectangle with sides 6 cm and 4 cm.

Draw another rectangle of same area with one side 7 cm.

95. In the figure, the radius of the circle is 5 cm. Centre is the origin.



a) Find the co-ordinates of the ponits of intersection of the circle with the X and Y axes.

b) Write the equation of the circle.

c) Find the Co-ordinates of any other two points on the circle.

96. The details of income tax given by the teachers of a school is given below.

a)

Income tax in rupees	**Number of Teachers**
30,000 - 40,000	4
40,000 - 50,000	6
50,000 - 60,000	5
60,000 - 70,000	4
70,000 - 80,000	4

a) The income tax of the teachers at what position is taken as the median ?

b) What is the assumed income tax of 11^{th} teacher?

c) Find the median tax.

97. Consider the pattern

1

2 3 4

5 6 7 8 9

10 11 12 13 14 15 16

....

....

a) Write the next line

b) Write the sequence of number of numbers in each raw.

c) Write the algebraic form of the sequence 1,3,5,7...........

d) How may numbers are there in 30^{the} raw

e) Write the first and last number in the 30^{th} row.

98. a) A sector of a circle with radius 18 cm and central angle 240^0 is bent to form a cone.

i) Find the slant height of the cone

ii) Find the base radius of the cone

iii) Find the curved surface area.

b) Consider a cone of height and radius equal, a hemisphere, a cylinder of equal radius and height and a sphere. Radius of each figures is 'r' unit. Prove that the volumes of these are in arithmetic sequence.

99. Read the following and understand the mathematical idea expressed in it and answer the questions that follows.

1,4,9,16....are the squares of the counting numbers. The remainders got by dividing the square numbers with natural numbers have a cyclic property. For example the remainders on dividing these numbers by 3 are tabulated here

Number	1	4	9	16	25	36	49	....
Remainder	1	1	0	1	1	0	1	....

a) Write the 8^{th} term of the sequence 1, 4, 9, 16......

b) What is the remainder when 100 is divided by 3

c) Which are the possible remainders when a perfect square is divided by 3

d) Find the remainder when the numbers of the sequence 5^2, 8^2, 11^2, ... are divided by 3.

e) What is the remainder that leaves on dividing the terms of the sequence 4^2, 7^2, 10^2, ... by 3.

100. The sum of first nine terms of an arithmetic sequence is 261 and sum of next 6 terms is 444.

a) Find 5^{th} and 8^{th} term

b) Find the first term and common difference

c) Write the sequence

d) Write the algebraic expression of the arithmetic sequence

e) Find the sum of first 15 terms of the arithmetic sequence 6,12,18..........

101. Height and radius of a conical vessel are 8cm and 5 cm respectively. It is completely filled with water. Some lead balls of radius 0.5cm were immersed in it. One fourth of water spilled out. Find the number of balls immersed.

102. Read the mathematical concept carefully and answer the following.

1 = 1

1+2 = 3

1+2+3 = 6

1+2+3+4=10

Consider the sequence 1,3,6,10.......

It is the sum of natural numbers. These numbers are called traingle numbers.

1+3 = 4 ; 3+6 = 9, 6+10 = 16 ....

1, 4, 9, 16, ... are called square numbers. Each square number is the sum of two consecutive triangle numbers.

a) Find the next term of the sequence 1,3,6,10.............

b) Find the fifth square number

c) Write the algebraic form of the sequence of traingle numbers

d) Write the algebraic expression of the sequence of square numbers.

e) If 20th triangle number is x and 21st triangle number is y then y-x = ...

103.

1

3 5 7

9 11 13 15 17

....

....

....

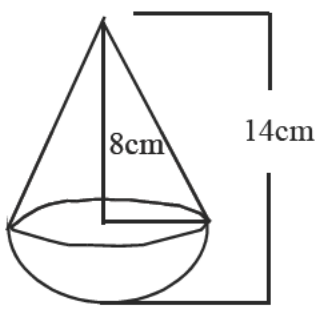
a) Write the next two lines of this pattern

b) How many numbers are there in 10^{th} row.

c) Find the sum of all numbers in the 10^{th} row..

d) Write the algebraic form of the arithmetic sequence 1, 3, 5, 7, ...

104.



A toy is made in the form of a cone mounted on a hemisphere.

The total length of the toy is 14 cm and height of the cone alone is 8 cm.

a) Find the radius of the hemisphere ?

b) Find the total surface area of the toy.

c) Find the total cost of painting 500 such toys at the rate of Rs. 2 per square centimeter.

EQUIP - 2024

SSLC - EXAMINATION SUPPORT MATERIAL

MATHEMATICS - ENGLISH MEDIUM

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1 Marks Questions - Answers

1.	27	(1)
2.	60^0	(1)
3.	$\frac{9}{25}$	(1)
4.	$\frac{7}{25}$	(1)
5.	4	(1)
6.	7	(1)
7.	90^0	(1)
8.	$2+\sqrt{2},\ 2-\sqrt{2}$,	(1)
9.	(2,2)	(1)
10.	$1\pm\sqrt{2}$	(1)
11.	0	(1)
12.	rhombus	(1)
13.	$\frac{2}{11}$	(1)
14.	$\frac{AC}{BC}$	(1)
15.	60^0	(1)
16.	(6,1)	(1)
17.	$\left(2,\frac{-5}{3}\right)$	(1)
18.	(0,0)	(1)
19.	16cm	(1)
20.	(x-3)	(1)

21. 4 (1)

22. 110^0 (1)

23. $4/10$ (1)

24. $\frac{AB}{AC}$ (1)

25. AC = 5cm (1)

26. 1 (1)

27. No Solution (1)

28. 12cm (1)

29. 16cm (1)

30. x-1 is a factor (1)

2 Marks Questions - Answers

31. a) d=3 (1)

    b) 30 (1)

32. a) $\angle A = 50^0$ (1)

    b) $\angle OBC = 40^0$ (1)

33. $\frac{\pi}{4}$ (2)

34. (-2,6), (6,3) (1+1=2)

35. a) Mean = 31 (1)

    b) Median = 31 (1)

36. 8, 5 (2)

37. $\frac{a}{\text{Sin } A} = 2R \Rightarrow A = 60$ (2)

    a=4 $\quad \text{Sin } A = \frac{\sqrt{3}}{2} \quad \frac{a}{\text{Sin } A} = \frac{4}{\frac{\sqrt{3}}{2}} = \frac{8}{\sqrt{3}}$ (2)

38. $r=\frac{A}{S}\quad A=54,\quad S=18$ (1)

$r = 3$

39. a) 3 (1)

b) 26, 3x10-4

= 30-4

= 26 (1)

40. a) $\angle APD = \frac{80}{2}$

= 40 (1)

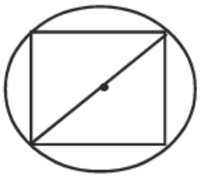
b) $\angle ABD = 180-40$

= 140 (1)

41.

radius of the circle r

diameter of circle = diagonal of square



probability $=\frac{\frac{(2r)^2}{2}}{\pi r^2} = \frac{2r^2}{\pi r^2} = \frac{2}{\pi}$ (2)

42. a) for drawing X, Y axes and marking the points. (1)

b) E or (4,5) (1)

43. Arranging in ascending or descending order (1)

13, 20, 30, 30, 45, 50, 53, 56, 56, 56, 56, 66, 70

Median = 53 (1)

44. $\text{Sin}A = \frac{3}{5}$ (1)

$\text{Cos}A = \frac{4}{5}$ (1)

45. $r=\frac{A}{S}$

$A = \frac{\sqrt{3}}{4}$x10x10 (1)

S = 15

$$r = \frac{\sqrt{3} x 10 x 10}{4 x 15}$$

$$== \frac{5}{\sqrt{3}}$$ (1)

46. Area of triangle = $\frac{48}{4}$

= 12

a) height = 8 (1)

b) Volume = $\frac{1}{3} x 12^2 x 8$

= $384cm^3$ (1)

47. a) $x_n = 5n-4$ (1)

b) $x_{15} = 5x15-4 = 71$ (1)

48. PA x PB = PC X PD

4 x 6 = 2 x PD (2)

$$\therefore \text{ PD} = \frac{4x6}{2} = 12$$

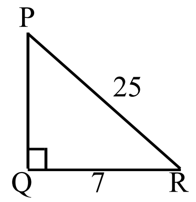
49.

$$1 - \frac{2}{\pi}$$ (2)

50. A (0,0) C(4,2) (1)

51. Median Weight = $\frac{25+1}{2} =$ Weight of 13^{th} student = 50kg (2)

52.



$$PQ = \sqrt{25^2 - 7^2} = \sqrt{625 - 49}$$ (1)

$$= \sqrt{576} = 24cm$$ (1)

$\tan P = \frac{7}{24}$

53. Area = $rs = 3x\frac{20}{2} = 10cm^2$ (2)

54. a) 4x13+4x10

= 52 + 40 = 92cm (1)

b) $\sqrt{13^2 - 5^2} = \sqrt{169 - 25} = \sqrt{144} = 12cm$ (1)

3 Marks Questions - Answers

55. For correct figure (3)

56. a) 16 - x (1)

b) PD = 15 (1)

c) PA = 10 (1)

57. For correct figure (3)

58. By considering the parallelograms QABC, ARBC, and ABPC

P = (4,5) Q = (2,1) R=(6,3) (3)

59. a) P(1) = 6 (1)

P(6) = 0

b) 1, 6 (1)

c) (x-1) (x-2) (x-3) (1)

60. a) d=6 (1)

b) $S_n = 4n^2 + 12n$

$S_n+9 = 4n^2 + 12n + 9$

$= (2n+3)^2$ (2)

61. a) 2, 3, 4, 5, 6, 7,

8, 9, 10, 11, 12 (2)

b) 7 (1)

62. For drawing rectangle (1)

for drawing square (2)

63. a) 40 - x

b) $\frac{x}{4}, \frac{40-x}{4}$ (1)

c) $\left(\frac{x}{4}\right)^2 + \left(\frac{40-x}{4}\right)^2 = 58$ (1)

d) 28, 12 cm (!)

4 Mark Questions - Answers

64. For drawing the circle with radius 4 (1)

For drawing triangle (2)

65. a) Slope = $\frac{4}{3}$ (1)

b) (10, 13), (13, 17) (2)

c) $\frac{2-9}{2-7} = \frac{-7}{-5} = \frac{7}{5}$

not a point. (1)

d) Point on x axis (x,0)

Slope = $\frac{5-0}{4-x} = \frac{4}{3}$

$$\frac{5}{4-x} = \frac{4}{3}$$
$$15 = 16 - 4x$$
$$4x = 16 - 15$$
$$= 1$$
$$x = 1/4$$

point $= \left(\frac{1}{4}, 0\right)$ (1)

66. a) 2^2-5x2+k = 0

-6+k = 0

$k = 6$ (1)

b) $P(3) = 0$ (1)

$P(4) = 4^2-20+6$

$= 2$ (1)

c) $P(3) = 0$

$\therefore$ a factor (1)

67. a) 5 (1)

b) 6 (1)

c) 5, 11, 17...... (1)

d) $320 + 20 = 340$ (1)

68. a) $50x35 = 1750$ (1)

b) $\frac{600}{1750}$ (1)

c) $\frac{300}{1750}$ (1)

d) $\frac{850}{1750}$ (1)

69. To draw the square with specific measures (4)

70 a) $5^2=25$

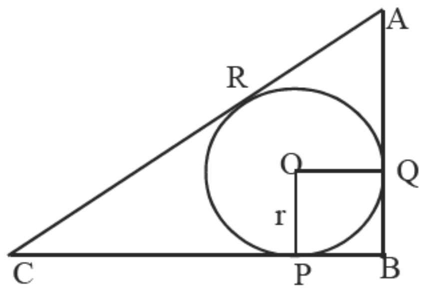
b) $x^2+10x+25 = 24+25 = 49$

ie $(x+5)^2 = 7^2$ (2)

$x+5 = 7$	$x+5= -7$
$x=7-5 = 2$	$x=-7-2 = -9$

(2)

71.



$AC^2 = 12^2+5^2 = 13^2$

$AC = 13$

$CP = 12 - r$

$CR = 12 - r$

$AR = AQ = 5-r$

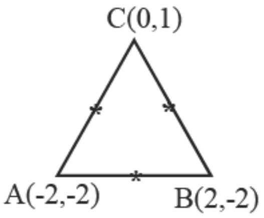
$12-r + 5-r = 13$

$17-2r = 13$

$r = \frac{17-13}{2} = \frac{4}{2} = 2$ (4)

72.

a)



Mid-point of AB = $\left(\frac{-2+2}{2}, \frac{-2+-2}{2}\right)$

$= (0, -2)$

Mid-point of BC = $\left(\frac{2+0}{2}, \frac{-2+1}{2}\right)$

$= (1, -1/2)$

Mid-point of AC = $\left(\frac{-2+0}{2}, \frac{-2+1}{2}\right)$

$= (1, -1/2)$ (3)

b) $AC^2 = 2^2 + 3^2 = 13$

$BC^2 = 2^2 + 3^2 = 13$

$\therefore$ AC = BC

$\therefore$ Isosceles (1)

73. Draw the rhombus with the specific measures. (4)

74. a) 1 (1)

b) 8 (1)

c) 8n-7 (2)

75. a) $\frac{3x4}{10x10} = \frac{12}{100}$ (1)

b) $\frac{7x6}{10x10} = \frac{42}{100}$ (1)

c) 1 - P (Both are black)

$= 1 - \frac{12}{100} = \frac{88}{100}$ (2)

5 Marks Questions - Answers

76. a) x+2 (1)

b) $x^2+2x=224$ (2)

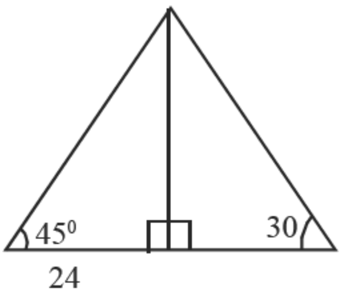
c) l = 16, b = 14

Perimeter = 60 (2)

77. a) 24 (2)

b) For correct figure (3)

78. a)



(1)

b) 24 m (2)

c) $48 + 24\sqrt{2}$ (2)

79. a)) $AB = \sqrt{212}$

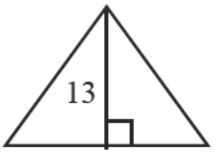
$BC = \sqrt{106}$

$AC = \sqrt{106}$

$AB^2 = BC^2 + AC^2$ (3)

b) Square (2)

80. a)



Triangle with base 10 and height 13cm

or

Sides are $\sqrt{194}$ cm; $\sqrt{194}$ cm and 10cm (3)

b) h=12, a=e

$a = 12\sqrt{2}$

$r = \frac{1}{3}a^2h$

$= \frac{1}{3} x 12\sqrt{2} x 12\sqrt{2} x 12$ (3)

$= 1152 cm^3$

81. a)

AP : PB = 1:2

$\therefore$ P is (3,3) (2)

PQ + QB - 1:1

Q is (5,4) (1)

b) $(x-2)^2 + (y-1)^2 = 5$ (2)

82.

Age	Number
below 10	5
below 20	20
below 30	40
below 40	65
below 50	80
below 60	91
below 70	100

10

(1)

a) 50, 51 (1)

b) $30+\frac{5}{25}=30.2$ (1)

c) Median = $\frac{50^{th}+51^{st}}{2}$

$$=30\frac{100}{25}$$
$$=30+4=34$$ (2)

83. a) 2x-1, 2x+1 (1)

b) $x^2+(2x-1)^2=(2x+1)^2$ (1)

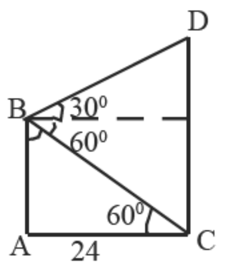
$x^2+4x^2-4x+1=4x^2+4x+1$

$x^2-8x=0$ (1)

$x(x-8)=0 \quad x=8$ (1)

Sides 8cm, 15cm, 17cm (1)

84.



(1)

Height of the small building = $24\sqrt{3}$ (2)

Height of taller building

$$=\frac{24}{\sqrt{3}}+24\sqrt{3}$$
$$=8\sqrt{3}+24\sqrt{3}$$
$$=32\sqrt{3}$$ (3)

85. a) (2,14) (2)

b) $\sqrt{8^2+6^6}=$ 10 unit (1)

c) 10 x 10 = 100 square unit (2)

86. a) $\text{radius}^2 = 5^2 - 4^2$

$= 9$

radius = 3 (2)

For drawing the figure (2)

Length = 5cm (1)

87. For drawing rectangle of sides 6, 4 (1)

Drawing another rectangle with one side 7 (4)

88. a) (3, 4) (1)

b) 5 unit (1)

c) $(x-3)^2 + (y-4)^2 - 25$ (1)

d) (-2,3) (2)

89.

60	4
120	14
180	26
240	41
300	55
360	59

a) 59 (1)

b) 182 (2)

c) 194 (2)

90. a) $x+4$ (1)

b) $x(x+4) = 96$

$x^2 + 4x = 96$

$x^2 + 4x + 2^2 = 22+96$

$(x+2)^2 = 100 = 10^2$

$x+2 = 10$ | breadth = 8cm

$x=10-2=8$ | length = 12cm (4)

91. a) $MX=\frac{12}{\sqrt{3}},\ XY=\frac{12}{\sqrt{3}}+12$ (1)

b) Perimeter = XY + YZ + ZX

$=\frac{24}{\sqrt{3}}+12\sqrt{2}+\frac{12}{\sqrt{3}}+12$ (2)

$\frac{36}{\sqrt{3}}+12\sqrt{2}+12$

c) $2:\sqrt{6}\ :\ \sqrt{3}+1$ (2)

92. a) 6cm (1)

b) 18cm (2)

c) A is $\left(-3\sqrt{3},0\right)$ (2)

93. a) AB + BC + AC

= 8 + 9 + 7 = 24cm (1)

b) $\angle PQR = 120^0$, $\angle POQ = 110^0$ (2)

c) $\angle RPQ = 65^0$, $\angle BRQ = 65^0$ (2)

94. Draw the rectangle. Draw a rectangle of the same area. (5)

95. a) (5,0) (-5,0) (0,5) (0,-5) (2)

b) $x^2+y^2 = 25$ (1)

c) (3,4) (-3,4) (2)

96. a) $\frac{23+1}{2}$ = Tax of 12th teacher (1)

b) Assumed tax for 11th teacher.

$d=\frac{10000}{5}=2000$

$=50000+{}^{d}\!/_{2}$

$=50000+1000$

$=51000$ (2)

c) Median Tax = 51000+2000

53,000 (2)

97. a) 17 18 19 20 21 22 23 24 25 (1)

b) 1, 3, 5, 7, ... (1)

c) $x_n = 2n-1$ (1)

d) $x_{30} = 59$ (1)

e) $30^2 = 900$ (last number) (1)

First Number = 842 (2)

98 a) (i) 18cm (1)

ii) r = 12 cm (1)

iii) $216\pi \text{cm}^2$ (1)

b) $\frac{1}{3}\pi r^3, \quad \frac{2}{3}\pi r^3, \quad \pi r^3, \quad \frac{4}{3}\pi r^3$ (1)

$d = \frac{1}{3}\pi r^3$ (2)

99. a) 64 (1)

b) 1 (1)

c) 0, 1 (1)

d) 1 (1)

e) 1 (1)

100. a) 5^{th} term = $\frac{261}{9} = 29$ (1)

8^{th} term = $\frac{261+444}{15}$

= $\frac{705}{15} = 47$ (1)

b) $d = \frac{47-29}{8-5} = \frac{18}{3} = 6$

f = 29-24 = 5 (1)

c) 6n-1 (1)

d) 705 + 15 = 720 (2)

101. Volume of the cone

$= \frac{1}{3} x\pi x5x5x8$ (1)

Volume of sphase $= \frac{1}{4}\left(\frac{1}{3} x\pi 5x5x8\right)$

$= \frac{1}{4} x\pi x \frac{5}{10} x \frac{5}{10} x \frac{5}{10}$ (2)

$n = \frac{4}{3} x\pi x \frac{5}{10} x \frac{5}{10} x \frac{5}{10} = \frac{1}{12} x\pi x5x5x8$

n = 100 (2)

102. a) 15 (1)

b) 25 (1)

c) $n\left(\frac{n+1}{2}\right)$ (1)

d) n^2 (1)

e) 21 (1)

103. a) 19, 21, 23, 25, 27, 29, 31

33, 35, 37, 39, 41, 43, 45, 47, 49 (1)

b) $x_n = 2n-1$

$x_{10} = 2x10-1 = 19$ (1)

c) $\frac{19}{2}(163+199) = 19x181 = 3439$ (2)

d) 2n-1 (1)

104. a) 6cm (1)

b) $132x3.14cm^2$

$= 2x\pi x6^2 + \pi x6x10$

$= 72\pi + 60\pi = 132\pi cm^2$

$= 132x3.14cm^2$

$= 414.48\ cm^2$ (2)

c) 414.48 x 2x500

= 828.96 x 500 rupees (2)

= 414,480 rupees

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