ICSE Class 10 Maths Mock Sample Paper 2 with Solutions

SECTION A

Attempt all questions from this section.
Question 1
(a) Find the remainder when $2x^3 - 3x^2 + 7x - 8$ is divided by $x - 1$. [3]

Solution:
Let $p(x) = 2x^3 - 3x^2 + 7x - 8$
$g(x) = x - 1$

$$
\begin{array}{r|rrrr}
 & 2x^2 & -x & +6 & \\
\hline
x-1 & 2x^3 & -3x^2 & +7x & -8 \\
- & 2x^3 & -2x^2 & & \\
\hline
 & & -x^2 & +7x & -8 \\
 & - & -x^2 & +x & \\
\hline
 & & & 6x & -8 \\
 & & - & 6x & -6 \\
\hline
 & & & & -2
\end{array}
$$

Remainder = -2

(b) Find the value of cosec (65° + θ) - sec (25° - θ). [3]

Solution:
cosec (65° + θ) - sec (25° - θ)
= cosec [90° - (25° - θ)] - sec (25° - θ)
= sec (25° - θ) - sec (25° - θ)
= 0

(c) A shopkeeper buys an article at a discount of 25% from the wholesaler. The printed price of the article is Rs. 5000 and the rate of sales tax is 10%. The shopkeeper sells it to the customer at a discount of 5% of the printed price and charges the sales tax at the same rate. Find:
(i) the amount paid by the customer

(ii) the VAT (Value Added Tax) paid by the shopkeeper. [4]

Solution:
Given,
The printed price of the article = Rs. 5000
Discount = 25%
The purchase price for shopkeeper = Rs. 5000 - (25% of Rs. 5000)
= Rs. 5000 - (25/100) × Rs. 5000
= Rs. 5000 - 1250
= Rs. 3750
Tax paid by the shopkeeper = 10% of Rs. 3750 = Rs. 375
Price paid by the shopkeeper for article = Rs. 3750 + Rs. 375 = Rs. 4125
(i) Discount given to the customer = 5% of Rs. 5000 = Rs. 250
Price of article after discount = Rs. 5000 - Rs. 250 = Rs. 4750
Tax paid by the customer = 10% of Rs. 4750 = Rs. 475
Price paid by the customer = Rs. 4750 + Rs. 475 = Rs. 5225
(ii) VAT paid by the shopkeeper = Tax charged when selling - Tax paid when buying
= Rs. 475 - Rs. 375
= Rs. 100

Question 2
(a) Manoj opened a recurring deposit account with Punjab National Bank and deposited Rs. 500 per month for 3 years. The bank paid him Rs. 20220 on maturity. Find the rate of interest paid by the bank. [3]

Solution:
Given,
Monthly installment = P = Rs. 500
n = 3 years = 36 months
Let r be the rate of interest.
Maturity value = (P × n) + P × [n(n + 1)/ 2 × 12] × (r/100)
20220 = (500 × 36) + 500 × [(36 × 37)/ (2 × 12)] × (r/ 100)
20220 - 18000 = 500 × (111/2) × (r/100)
2220 = 555r/ 2
r = (2220 × 2)/ 555
r = 8%
Hence, the rate of interest paid by the bank is 8%.

(b) The volume and curved surface of a cylinder are equal numerically. If the height is 3 ½ times the radius of the base, find the radius. [3]

Solution:
Let r be the radius and h be the height of a cylinder.
Given,
h = 3 ½ × 2 = 7r/2
The volume of cylinder = Curved surface area of the cylinder (given)
$\pi r^2 h = 2\pi rh$
$r^2 = 2r$
r = 2 units
Hence, the radius of the base of the cylinder is 2 units.

(c) A solid consisting of a right circular cone, standing on a hemisphere, is placed upright in a right circular cylinder full of water and touches the bottom. Find the volume of water left in the cylinder having given that the radius of the cylinder is 3 cm and its height is 6 cm, the radius of the hemisphere is 2 cm and the height of the cone is 4 cm. Give your answer to the nearest cubic centimeters. [4]

Solution:
Given,
Height of the cylinder = H = 6 cm
Radius of the cylinder = R = 3 cm
Height of the cone = h = 4 cm
Radius of the hemisphere = Radius of cone = r = 2 cm
Volume of water in the cylinder when it is full = $\pi r^2 h$
$= \pi \times 3 \times 3 \times 6$
$= 54\pi$ cm^3
Volume of water displaced = volume of cone + volume of hemisphere
$= (1/3)\ \pi r^2 h + (2/3)\pi r^3$
$= (1/3)\pi r^2(h + 2r)$
$= (1/3)\ \pi \times 2 \times 2(4 + 2 \times 2)$
$= (1/3)\ \pi \times 4 \times 8$
$= 32\pi/3$ cm^3
Volume of water left in the cylinder = $54\pi - (32\pi/3)$
$= (162\pi - 32\pi)/\ 3$
$= 130\pi/3$
$= (130/3) \times (22/7)$
$= 136.19$
Hence, the volume of water left in the cylinder is 136 cm^3. (approx.)

Question 3
(a) Using factor theorem, show that (x - 3) is a factor of $x^3 - 7x^2 + 15x - 9$. Hence, factorize the given expression completely. [3]

Solution:
Let $p(x) = x^3 - 7x^2 - 15x - 9$
For checking (x - 3) is a factor of p(x) or not, substitute x = 3 in p(x),
$p(3) = (3)^3 - 7(3)^2 + 15(3) - 9$
$= 27 - 63 + 45 - 9$
$= 72 - 72$
$= 0$
Therefore, (x - 3) is a factor of the given polynomial.
By dividing p(x) by (x - 3), the quotient = $x^2 - 4x + 3$
$x^3 - 7x^2 + 15x - 9 = (x - 3)(x^2 - 4x + 3)$
$= (x - 3)(x^2 - 3x - x + 3)$
$= (x - 3)\ [x(x - 3) - 1(x - 3)]$
$= (x - 3)(x - 3)(x - 1)$
$= (x - 3)^2(x\ \ 1)$

(b) Find the 2 x 2 matrix X which satisfies the equation:

$$\begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix}\begin{bmatrix} 0 & 2 \\ 5 & 3 \end{bmatrix} + 2X = \begin{bmatrix} 1 & -5 \\ -4 & 6 \end{bmatrix}$$

[3]

Solution:
Given,

$$\begin{bmatrix} 3 & 7 \\ 2 & 4 \end{bmatrix}\begin{bmatrix} 0 & 2 \\ 5 & 3 \end{bmatrix} + 2X = \begin{bmatrix} 1 & -5 \\ -4 & 6 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 0+35 & 6+21 \\ 0+20 & 4+12 \end{bmatrix} + 2X = \begin{bmatrix} 1 & -5 \\ -4 & 6 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 35 & 27 \\ 20 & 16 \end{bmatrix} + 2X = \begin{bmatrix} 1 & -5 \\ -4 & 6 \end{bmatrix}$$

$$\Rightarrow 2X = \begin{bmatrix} 1 & -5 \\ -4 & 6 \end{bmatrix} - \begin{bmatrix} 35 & 27 \\ 20 & 16 \end{bmatrix}$$

$$\Rightarrow 2X = \begin{bmatrix} -34 & -32 \\ -24 & -10 \end{bmatrix}$$

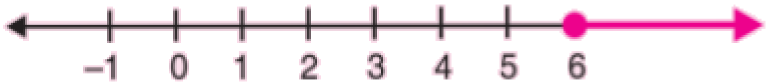
$$\Rightarrow X = \begin{bmatrix} \frac{-34}{2} & \frac{-32}{2} \\ \frac{-24}{2} & \frac{-10}{2} \end{bmatrix}$$

$$\Rightarrow X = \begin{bmatrix} -17 & -16 \\ -12 & -5 \end{bmatrix}$$

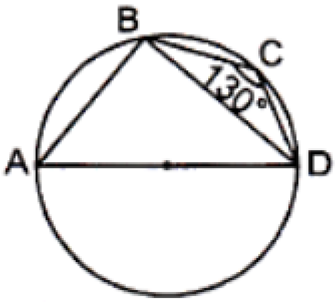
(c) Solve the inequation:
$12 + 1\frac{5}{6}x \le 5 + 3x, x \in R$
Represent the solution on a number line. [4]

Solution:
Given,
$12 + 1\frac{5}{6}x \le 5 + 3x$
$12 + (11/6)x \le 5 + 3x$
$12 - 5 \le 3x - (11x/6)$
$7 \le (18x - 11x)/6$

$7 \le 7x/6$
$x \ge (7 \times 6)/7$
$x \ge 6$
Therefore, $\{x : x \in R \text{ and } \ge 6\}$



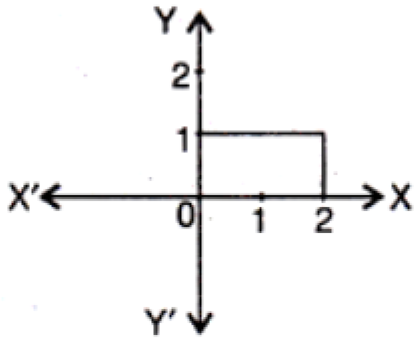
Question 4
(a) In the figure, AD is the diameter of the circle. If ∠BCD = 130°, calculate:
(i) ∠DAB
(ii) ∠ADB



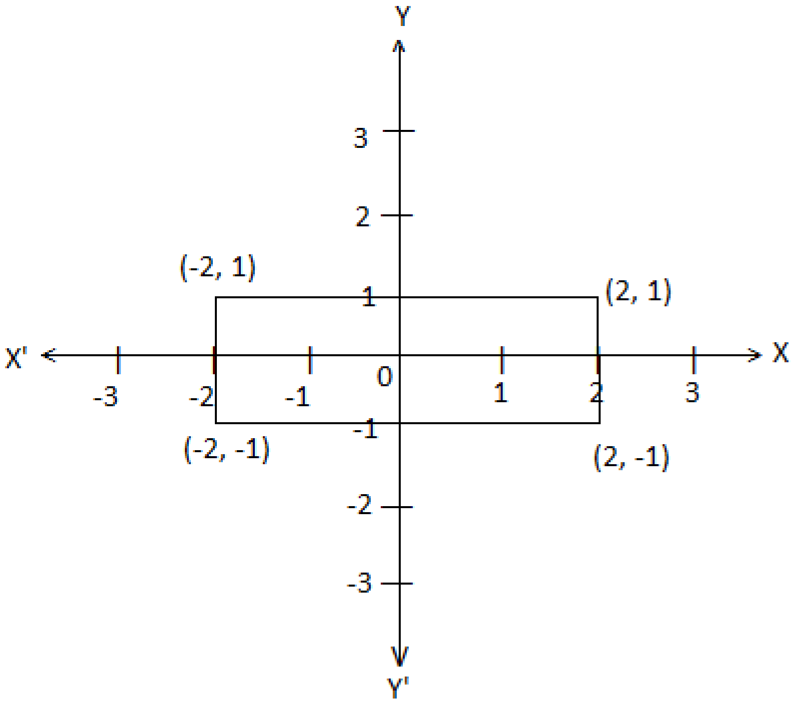
[3]

Solution:
Given,
AD is the diameter of the circle.
∠BCD = 130°
(i) ABCD is a cyclic quadrilateral. (from the given figure)
We know that the sum of the opposite angles of a cyclic quadrilateral is supplementary.
∠DAB + ∠BCD = 180°
∠DAB + 130° = 180°
∠DAB = 180° - 130°
∠DAB = 50°
(ii) The angle in a semicircle is a right angle.
Thus, in triangle ABD, ∠ABD = 90°
∠ABD + ∠ADB + ∠DAB = 180° (by the angle sum property of a triangle)
90° + ∠ADB + 50° = 180°
∠ADB = 180° - 90° - 50°
∠ADB = 40°

(b) Part of a geometrical figure is given in the diagram alongside. Complete the figure so that both the x-axis and y-axis are lines of symmetry of the completed figure. [3]



Solution:
The completed figure that shows both the x-axis and y-axis are lines of symmetry is:



(c) Calculate the mean wage correct to the nearest rupee for the following data:

Category	A	B	C	D	E	F	G
Wages in Rs per day	50	60	70	80	90	100	110
No. of workers	2	4	8	12	10	6	8

[4]

Solution:

Category	Wages in Rs per day (x)	No. of workers (f)	fx
A	50	2	100
B	60	4	240
C	70	8	560
D	80	12	960
E	90	10	900
F	100	6	600
G	110	8	880
		$\sum f = 50$	$\sum fx = 4240$

Mean = $\sum fx / \sum f$
= 4240/ 50
= 84.5
Hence, the approximate mean wage is Rs. 85.

SECTION - B

Attempt any four questions from this section.
Question 5
(a) Solve using the quadratic formula: $6x^2 + (12 - 8a)x - 16a = 0$ [3]

Solution:
Given,
$6x^2 + (12 - 8a)x - 16a = 0$
Comparing with the standard form $ax^2 + bx + c = 0$
a = 6, b = 12 - 8a, c = -16a
Quadratic formula:
$x = [-b \pm \sqrt{(b^2 - 4ac)}] / 2a$
$x = [-(12 - 8a) \pm \sqrt{\{(12 - 8a)^2 - 4(6)(-16a)\}}] / 2(6)$
$= [(8a - 12) \pm \sqrt{(144 + 64a^2 - 192a + 384a)}] / 12$
$= [(8a - 12) \pm \sqrt{(144 + 64a^2 + 192a)}]/ 12$
$= [(8a - 12) \pm \sqrt{(12 + 8a)^2}]/ 12$
$= [(8a - 12) \pm (12 + 8a)] /12$
$x = (8a - 12 + 12 + 8a)/ 12$, $x = (8a - 12 - 12 - 8a)/ 12$
$x = 16a/12$, $x = -24/12$
$x = 4a/3$, $x = -2$

(b) Deepika opened a savings bank account in a bank. Her passbook entries are shown below:

Date	Particulars	Withdrawals	Deposits Rs	Balance Rs

Jan 1	B/F	_	_	6360
Jan 12	By cash	_	750	7110
Feb 15	To self	5000	_	2110
June 6	To cheque	354	_	1756
July 18	By cheque	_	543	2299

She closed the account on 29 July and received Rs. 2354.20 as balance. Calculate the rate of interest. [3]

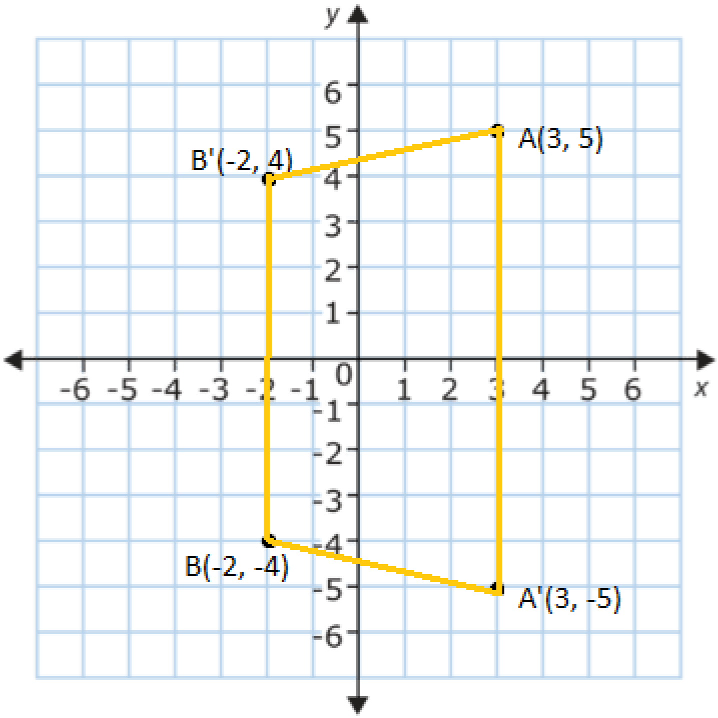
Solution:

Month	Qualifying amount for interest
Jan	Rs. 7110
Feb	Rs. 2110
Mar	Rs. 2110
Apr	Rs. 2110
May	Rs. 2110
June	Rs. 1756
Total	Rs. 17306

Let R be the rate of interest.
Interest = PTR/100
= (17306 × 1 × R)/ 100 × 12
= 17306 R/ 1200
Given that, Deepika received Rs. 2354.20 as balance.
2354.20 = 2299 + (17306R/ 1200)
2354.20 - 2299 = 17306 R/1200
55.2 = 17306R/1200
R = (52.2 × 1200)/ 17306
R = 3.8%

(c) Use graph paper for this question.
(i) Plot the points A(3, 5) and B(-2, -4). Use 1 cm = 1 unit on both the axes.
(ii) A' is the image of A when reflected in the x-axis. Write down the coordinates of A' and plot it on the graph paper.
(iii) B' is the image of B when reflected in the y-axis followed by a reflection in the origin. Write down the coordinates of B' and plot it on the graph paper.
(iv) Write down the geometrical name of the figure AA'BB'. [4]

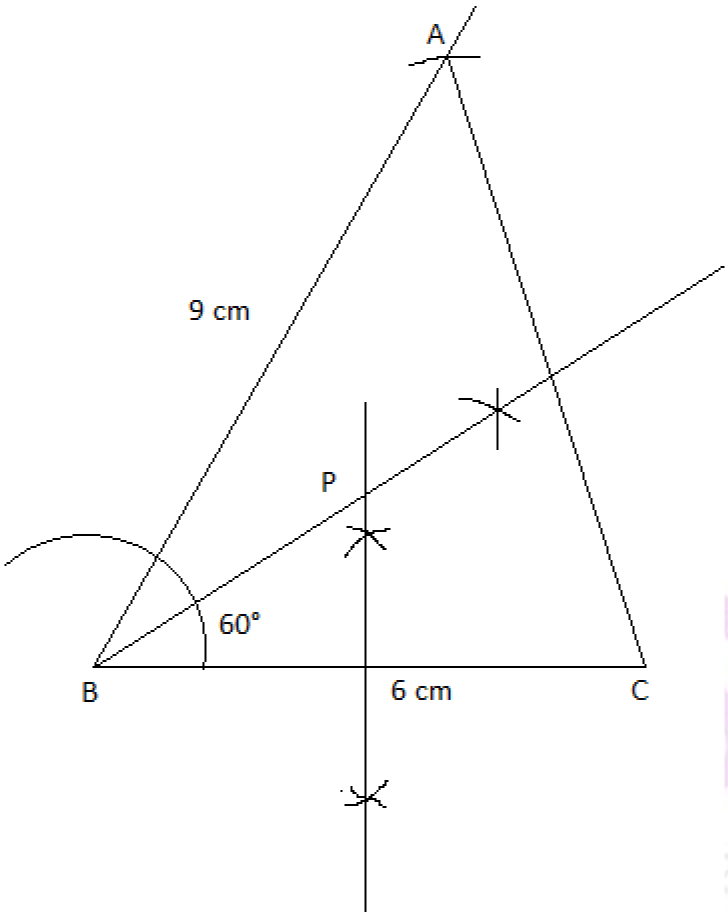
Solution:
Given,
A(3, 5) and B(-2, -4)
A' is the image of A when reflected in the x-axis.
B' is the image of B when reflected in the y-axis followed by a reflection in the origin.



(ii) Coordinates of A'(3, -5)
(iii) Coordinates of B'(-2, 4)
(iv) The geometrical name of the figure AA'BB' is an isosceles trapezium since AA' || BB' and AB' = A'B.

Question 6
(a) Construct a triangle ABC in which BC = 6 cm, AB = 9 cm, and ∠ABC = 60°. Construct the locus of all points inside triangle ABC, which are equidistant from B and C. [3]

Solution:



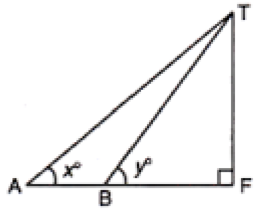
P is the locus of all points inside triangle ABC which is equidistant from B and C.

(b) The compound interest, calculated yearly on a certain sum of money for the second year is Rs. 880 and for the third year, it is Rs. 968. Calculate the rate of interest and the sum of money. [3]

Solution:
Given,
CI for the second year = Rs. 880
CI for the third year = Rs. 968
Now,
Simple interest (SI) on Rs. 880 for one year = Rs. 968 - Rs. 880 = Rs. 88
SI = PTR/100
R = (88 × 100)/ (880 × 1)
R = 10%
Let p be the actual sum.
Amount after 2 years - Amount after 1 year = CI for the second year
$p(1 + 10/100)^2 - p(1 + 10/100) = 880$
$p(110/100)^2 - p(110/100) = 880$
$p[(11/10)^2 - (11/10)] = 880$
p[(121/100) - (11/10)] = 880
p[(121 - 110)/ 100] = 800
p(11/100) = 880

p = 8000
Hence, the rate of interest is 10% and the actual sum of money is Rs. 8000.

(c) In the figure, not drawn to scale, TF is a tower. The elevation of T from A is x°, where tan x = ⅖ and AF = 200 m. The elevation of T from B, where AB = 80 m, is y°. Calculate:
(i) the height of the tower TF.
(ii) the angle y, correct to the nearest degree. [4]



Solution:
Given,
TF is a tower.
The elevation of T from A is x°, where tan x = ⅖ and AF = 200 m.
The elevation of T from B, where AB = 80 m, is y°.
(i) In right triangle AFT,
tan x = TF/AF
⅖ = TF/200
TF = (200 × 2)/ 5
TF = 80 m
Therefore, the height of the tower TF is 80 m.
(ii) BF = AF - AB = 200 - 80 = 120 m
TF = 80 m
In right triangle BFT,
tan y = TF/BF
tan y = 80/120
tan y = ⅔
y = $\tan^{-1}$(⅔)
y = 33.7
Therefore, the angle y = 34° (approx.)

Question 7
(a) A bag contains 8 red, 6 white, and 4 black balls. A ball is drawn at random from the bag. Find the probability that the drawn ball is:
(i) red or white
(ii) not black
(iii) neither white nor black. [3]

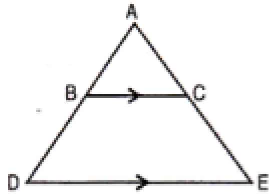
Solution:
Given,
A bag contains 8 red, 6 white, and 4 black balls.
Total number of outcomes = n(S) = 18
i.e. 8 + 6 + 4 = 18
(i) Let A be the event of getting a red or white ball.
Number of outcomes favourable to A = n(A) = 14

i.e. 8 + 6 = 14
P(A) = n(A)/n(S) = 14/18 = 7/9
(ii) Let B be the event of getting a ball that is not black.
Number of outcomes favourable to B = 14
i.e. Total number of balls - Black balls = 18 - 4 = 14
P(B) = n(B)/ n(S) = 14/18 = 7/9
(iii) Let C be the event of getting neither white nor black balls.
Number of outcomes favourable to C = n(C) = 8
i.e. only red balls = 8
P(C) = n(C)/n(S) = 8/18 = 4/9

(b) A can do a piece of work in x days and B can do it in (x + 16) days. If both working together can do it in 15 days, find x. [3]

Solution:
Given,
A can do a piece of work in x days and B can do it in (x + 16) days.
A and B can finish the work in 15 days.
i.e x(x + 16)/ (x + x + 16) = 15
$(x^2 + 16x)/ (2x + 16) = 15$
$x^2 + 16x = 15(2x + 16)$
$x^2 + 16x = 30x + 240$
$x^2 + 16x - 30x - 240 = 0$
$x^2 - 14x - 240 = 0$
$x^2 - 24x + 10x - 240 = 0$
x(x - 24) + 10(x - 24) = 0
(x + 10)(x - 24) = 0
x = -10, x = 24
The number of days cannot be negative.
Therefore, x = 24

(c) In the figure, BC is parallel to DE. Area of triangle ABC = 25 cm^2, area of trapezium BCED = 24 cm^2, DE = 14 cm. Calculate the length of BC.
[4]



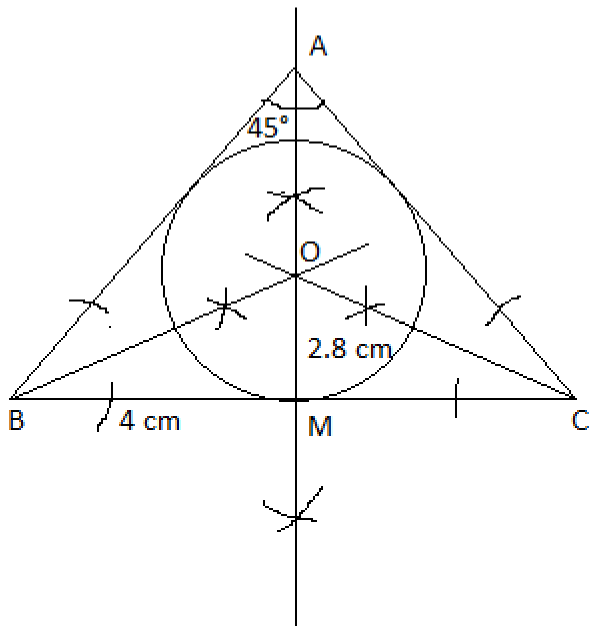
Solution:
Given,
Area of triangle ABC = 25 cm^2
Area of trapezium BCED = 24 cm^2
Area of triangle ADE = Area of triangle ABC + Area of trapezium
= 25 + 24
= 49 cm^2
In ΔABC and Δ ADE,
BC ∥ DE,

∠ABC = ∠ADE (corresponding angles)
∠ACB = ∠AED (corresponding angles)
∠BAC = ∠DAE (common)
By AAA similarity.
ΔABC ~ ΔADE
$ar(\Delta ABC)/ ar(\Delta ADE) = BC^2/DE^2$
$25/49 = BC^2/ (14)^2$
$BC^2 = (25 \times 196)/49$
$BC^2 = 4900/49$
$BC^2 = 100$
⇒ BC = 10 cm

Question 8

(a) Using a ruler and compasses only, construct an isosceles ΔABC having base = 4 cm, vertical angle = 45°, and median through vertex equal to 2.8 cm. Draw the incircle of the triangle. [3]

Solution:



(b) Using the properties of proportion, solve for x:
$[\sqrt{(a + x)} + \sqrt{(a - x)}] / [\sqrt{(a + x)} - \sqrt{(a - x)}] = b$ [3]

Solution:
Given,
$[\sqrt{(a + x)} + \sqrt{(a - x)}] / [\sqrt{(a + x)} - \sqrt{(a - x)}] = b$
Using componendo and dividendo rule,
$[\sqrt{(a + x)} + \sqrt{(a - x)} + \sqrt{(a + x)} - \sqrt{(a - x)}] / [\sqrt{(a + x)} + \sqrt{(a - x)} - \sqrt{(a + x)} + \sqrt{(a - x)}] = (b + 1)/ (b - 1)$
$2\sqrt{(a + x)} / 2\sqrt{(a - x)} = (b + 1)/ (b - 1)$
$\sqrt{(a + x)}/ \sqrt{(a - x)} = (b + 1)/ (b - 1)$
Squaring on both sides,
$(a + x)/ (a - x) = (b + 1)^2/ (b - 1)^2$
Again, using componendo and dividendo rule,

(a + x + a - x)/ (a + x - a + x) = [(b + 1)^2 + (b - 1)^2] / [(b + 1)^2 - (b - 1)^2]
2a/2x = 2(b^2 + 12)/ 2(2b)
a/x = (b^2 + 1)/2b
⇒ x/a = 2b/ (b^2 + 1)
⇒ x = 2ab/ (b^2 + 1)

(c) A man invests Rs. 8800 on buying shares of the face value of Rs. 100 each at a premium of 10% in a company. If he earns Rs. 1200 at the end of the year as a dividend, find:
(i) the number of shares he has in the company
(ii) the dividend percentage per share. [4]

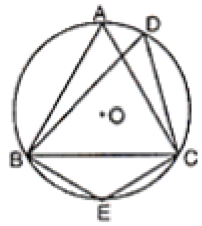
Solution:
Given,
Total investment = Rs. 8800
Nominal value = Rs. 100
Market value = 10% of Rs. 100 + Rs. 100
= Rs. 10 + Rs. 100
= Rs. 110
(i) Number of shared purchased = 8800/110 = 80
(ii) Let d be the dividend percentage.
Nominal value of 80 shares = 80 × Rs. 100 = Rs. 8000
According to the given,
d% of Rs. 8000 = Rs. 1200
(d/100) × 8000 = 1200
d × 80 = 1200
d = 1200/80
d = 15%
Hence, the dividend percentage per share is 15%.

Question 9
(a) Show that the points A(1, 0), B(5, 3), C(2, 7), and D(-2, 4) are the vertices of a square. [3]

Solution:
Given,
A(1, 0), B(5, 3), C(2, 7), and D(-2, 4)
Using distance formula,
AB = √[(5 - 1)^2 + (3 - 0)^2]
= √(16 + 9)
= √25
AB = 5
BC = √[(2 - 5)^2 + (7 - 3)^2]
= √(9 + 16)
= √25
BC = 5
CD = √[(-2 - 2)^2 + (4 - 7)^2]
= √(16 + 9)
= √25
CD = 5
DA = √[(1 + 2)^2 + (0 - 4)^2]
= √(9 + 16)

= √25
DA = 5
All the sides are equal.
AC and BD are the diagonals of quadrilateral ABCD.
Midpoint of AC = [(1 + 2)/2, (0 + 7)/2] = (3/2, 7/2)
Midpoint of BD = [(5 - 2)/2, (3 + 4)/2] = (3/2, 7/2)
Midpoint of AC = Midpoint of BD
Therefore, the given points are the vertices of a square.

(b) In the figure, O is the centre of the circle and ΔABC is equilateral. Find
(i) ∠BDC
(ii) ∠BEC. [3]



Solution:
Given,
ΔABC is an equilateral triangle.
∠ABC = ∠BCA = ∠CAB = 60°
(i) We know that the angles subtended by an arc on the circumference on the same segment are equal.
∠BDC = ∠CAB = 60°
(ii) ABEC is a cyclic quadrilateral.
We know that the sum of opposite angles of a cyclic quadrilateral is supplementary.
∠BAC + ∠BEC = 180°
60° + ∠BEC = 180°
∠BEC = 180° - 60°
∠BEC = 120°

(c) A bucket is raised from a well by means of a rope that is wound around a wheel of diameter 77 cm. Given that the bucket ascends in 1 min 28 sec with a uniform speed of 1. 1 m/sec, calculate the number of complete revolutions the wheel makes in raising the bucket. Take π = 22/7 [4]

Solution:
Given,
Diameter of wheel = 77 cm
Radius of the wheel = r = 77/2 cm = 77/200 m
Time = 1 min 28 sec = (60 + 28) sec = 88 sec
Speed = 1.1 m/s
Distance = Speed × Time
= 1.1 × 88
= 96.8 m
Number of revolutions = Distance/ Circumference of wheel
= 96.8/ 2πr
= 96.8/ [2 × (22/7) × (77/200)]
= 96.8/2.42

= 40

Therefore, the number of complete revolutions the wheel makes in raising the bucket is 40.

Question 10

(a) Prove the following identity:

$[1/ (\sin\theta + \cos\theta)] + [1/ (\sin\theta - \cos\theta)] = 2\sin\theta/ (1 - 2\cos^2\theta)$ [4]

Solution:

LHS = $[1/ (\sin\theta + \cos\theta)] + [1/ (\sin\theta - \cos\theta)]$

= $[(\sin\theta + \cos\theta + \sin\theta - \cos\theta)/ (\sin\theta + \cos\theta)(\sin\theta - \cos\theta)]$

= $2\sin\theta/ (\sin^2\theta - \cos^2\theta)$

= $2\sin\theta/ [(1 - \cos^2\theta) - \cos^2\theta]$

= $2\sin\theta/ (1 - \cos^2\theta - \cos^2\theta)$

= $2\sin\theta/ (1 - 2\cos^2\theta)$

= RHS

(b) The following table shows the distribution of the heights of a group of factory workers:

Height (in cm)	150 - 155	155 - 160	160 - 165	165 - 170	170 - 175	175 - 180	180 - 185
No. of workers	6	12	18	20	13	8	6

(i) Determine the cumulative frequencies.

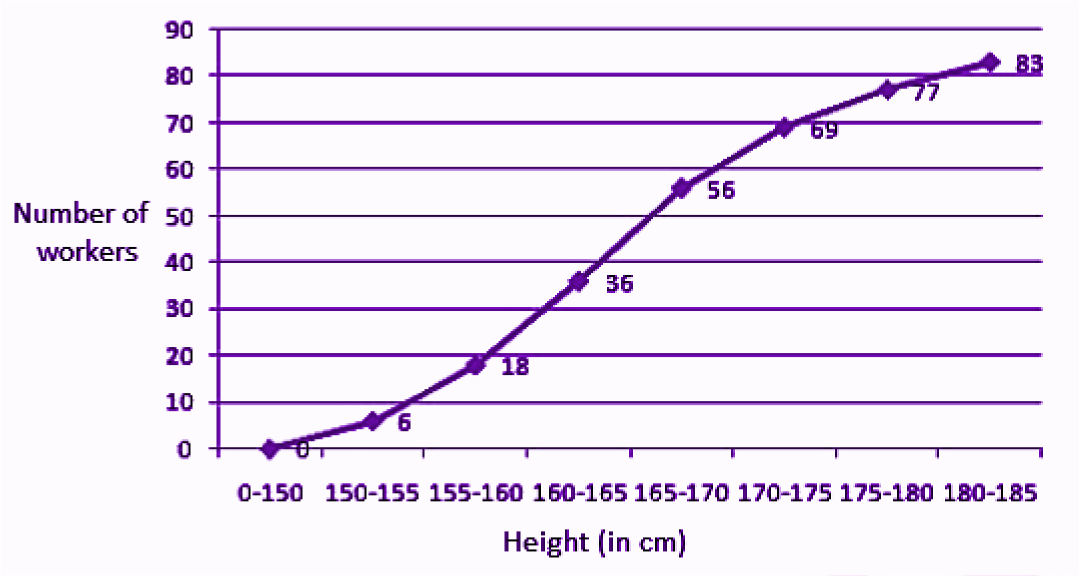
(ii) Draw the cumulative frequency curve on a graph paper. [6]

Solution:

(i) Cumulative frequency table:

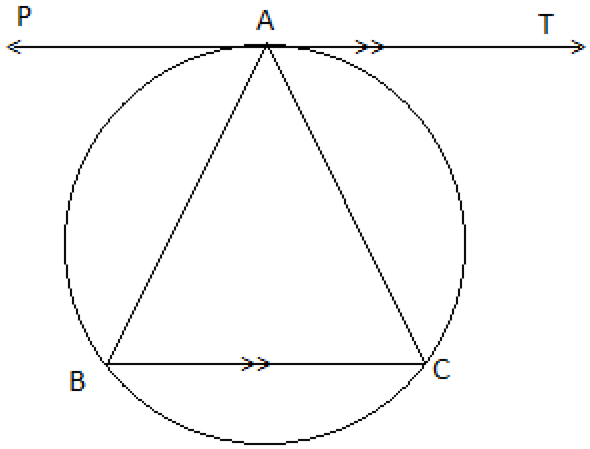
Height (in cm)	No. of workers (f)	Cumulative frequency (cf)
150 - 155	6	6
155 - 160	12	18
160 - 165	18	36
165 - 170	20	56
170 - 175	13	69
175 - 180	8	77
180 - 185	6	83

(ii) Plot the points (155, 6), (160, 18), (165, 36), (170, 56), (175, 69), (180, 77) and (185, 83) on the graph and then join them with a free hand to obtain a cumulative frequency curve.



Question 11
(a) PAT is a tangent to the circumcircle of ΔABC such that PT || BC. Show that AB = AC. [3]

Solution:
Given,
PAT is a tangent to the circumcircle of ΔABC such that PT || BC.



∠PAC = ∠ABC....(i) (angles in the alternate segment)
∠PAC = ∠ACB....(ii) (alternate interior angles)
From (i) and (ii),
∠ABC = ∠ACB
We know that the sides opposite to equal angles are equal.
AB = AC

(b) A die is thrown once. What is the probability that the number obtained is:
(i) even?
(ii) other than 4? [3]

Solution:
Given,
A die is thrown once.
Sample space = S = {1, 2, 3, 4, 5, 6}
n(S) = 6
(i) Let A be the event of getting an even number.
A = {2, 4, 6}
n(A) = 3
P(A) = n(A)/n(S)
= 3/6
= 1/2
(ii) Let B be the event of getting a number other than 4.
B = {1, 2, 3, 5, 6}
n(B) = 5
P(B) = n(B)/ n(S)
= 5/6

(c) Find the equation of the line passing through (-2, -4) and perpendicular to the line 3x - y + 5 = 0. [4]

Solution:
Given,
3x - y + 5 = 0....(i)
y = 3x + 5
Gradient of the line = 3
The slope of the which is perpendicular to (i) is m = -1/3
The equation of line passing through (-2, -4) and perpendicular to (i) is:
y - (-4) = m[x - (-2)]
y + 4 = (-1/3) (x + 2)
3(y + 4) = -x - 2
3y + 12 + x + 2 = 0
x + 3y + 14 = 0