Mathematics Part II (Geometry)

SSC Board Exam March 2027 – Practice Paper

Model Answer Paper

Time: 2 hours **Max. Marks: 40**

Model answers show one correct method; any other correct method gets full marks.

Q.1 (A) Four alternative answers are given for every sub-question. Select the correct alternative and write its alphabet with the sub-question number. **[4]**

(i) If △ABC ~ △PQR and AB : PQ = 4 : 9, then A(△ABC) : A(△PQR) = ?

(A) 2 : 3 (B) 4 : 9

(C) 16 : 81 (D) 81 : 16

Answer (1 mark)

(C) 16 : 81

The ratio of areas of similar triangles equals the ratio of squares of their corresponding sides: $4^2 : 9^2 = 16 : 81$.

(ii) Which of the following is a Pythagorean triplet?

(A) (5, 12, 14) (B) (7, 24, 25)

(C) (6, 8, 11) (D) (9, 12, 16)

Answer (1 mark)

(B) (7, 24, 25)

$7^2 + 24^2 = 49 + 576 = 625 = 25^2$.

(iii) An arc of a circle subtends an angle of 130° at the centre. What is the measure of an inscribed angle that intercepts the same arc?

(A) 130° (B) 65°

(C) 115° (D) 50°

Answer (1 mark)

(B) 65°

The measure of an inscribed angle is half the measure of the arc it intercepts: ½ × 130° = 65°.

(iv) What is the distance of the point (−8, 15) from the origin?

(A) 7 (B) 23

(C) 17 (D) 13

Answer (1 mark)

(C) 17

Distance = $\sqrt{((-8)^2 + 15^2)} = \sqrt{(64 + 225)} = \sqrt{289} = 17$.

Q.1 (B) Solve the following sub-questions. **[4]**

(i) If cos θ = 5/13, find the value of sec θ.

Answer (1 mark)

sec θ = 1/cos θ = 1 ÷ (5/13)

∴ sec θ = 13/5

(ii) Find the curved surface area of a cylinder whose radius is 7 cm and height is 10 cm. (π = 22/7)

Answer (1 mark)
Curved surface area = $2\pi rh = 2 \times 22/7 \times 7 \times 10$
∴ Curved surface area = 440 cm^2

(iii) Find the slope of the line passing through the points A(2, 3) and B(6, 11).

Answer (1 mark)
Slope = $(y_2 - y_1)/(x_2 - x_1) = (11 - 3)/(6 - 2) = 8/4$
∴ Slope of line AB = 2

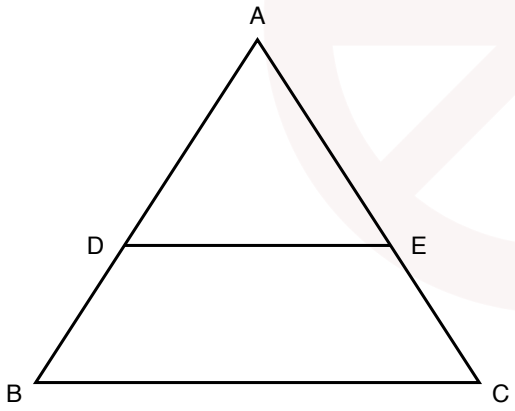
(iv) Two circles of radii 6 cm and 2 cm touch each other internally. Find the distance between their centres.

Answer (1 mark)
For circles touching internally, distance between centres = difference of radii = 6 − 2
∴ Distance between centres = 4 cm

Q.2 (A) Complete any two activities and rewrite them. **[4]**

(i) In the figure, in △ABC, seg DE ‖ side BC. If AD = 6, DB = 4 and AE = 9, complete the following activity to find EC.

Activity: In △ABC, seg DE ‖ side BC ...(Given)
∴ AD/DB = ☐/EC ...(☐)
∴ 6/4 = 9/EC
∴ EC = (☐ × 4)/6
∴ EC = ☐



Answer (2 marks)
In △ABC, seg DE ‖ side BC ...(Given)
∴ AD/DB = **AE**/EC ...(**Basic proportionality theorem**)
∴ 6/4 = 9/EC
∴ EC = (**9** × 4)/6
∴ EC = **6**

Marking: Each correctly filled box – ½ mark (4 boxes × ½ = 2 marks)

Examiner tip: Write the full name of the theorem (Basic proportionality theorem); 'BPT' alone may not get credit.

(ii) If $\sin\theta = 3/5$ and θ is an acute angle, complete the following activity to find $\cos\theta$ and $\tan\theta$.

Activity: $\sin^2\theta + \cos^2\theta =$ ☐

$\therefore (3/5)^2 + \cos^2\theta = 1$

$\therefore \cos^2\theta = 1 - 9/25 =$ ☐

$\therefore \cos\theta =$ ☐ ...(θ is acute)

$\tan\theta = \sin\theta/\cos\theta = (3/5) \div (4/5)$

$\therefore \tan\theta =$ ☐

Answer (2 marks)

$\sin^2\theta + \cos^2\theta =$ **1**

$\therefore (3/5)^2 + \cos^2\theta = 1$

$\therefore \cos^2\theta = 1 - 9/25 =$ **16/25**

$\therefore \cos\theta =$ **4/5** ...(θ is acute)

$\tan\theta = \sin\theta/\cos\theta = (3/5) \div (4/5)$

$\therefore \tan\theta =$ **3/4**

Marking: Each correctly filled box – ½ mark (4 boxes × ½ = 2 marks)

Examiner tip: Take only the positive square root for $\cos\theta$ because θ is acute.

(iii) In the figure, the circle with centre O touches line PA at point A. If OA = 5 and OP = 13, complete the following activity to find PA.

Activity: Seg OA is a radius and line PA is a tangent at A.

$\therefore \angle OAP =$ ☐ ...(Tangent theorem)

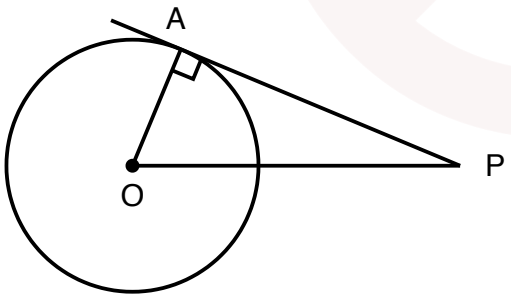
In $\triangle OAP$, by Pythagoras theorem,

$OP^2 = OA^2 +$ ☐

$\therefore 13^2 = 5^2 + PA^2$

$\therefore PA^2 = 169 - 25 =$ ☐

$\therefore PA =$ ☐



Answer (2 marks)

Seg OA is a radius and line PA is a tangent at A.

$\therefore \angle OAP =$ **90°** ...(Tangent theorem)

In $\triangle OAP$, by Pythagoras theorem,

$OP^2 = OA^2 +$ **PA^2**

$\therefore 13^2 = 5^2 + PA^2$

$\therefore PA^2 = 169 - 25 =$ **144**

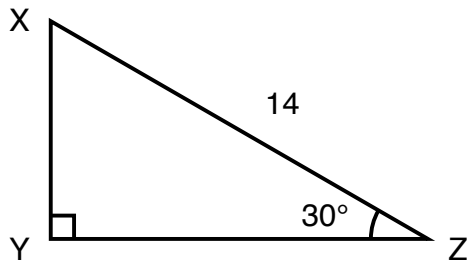
$\therefore PA =$ **12**

Marking: Each correctly filled box – ½ mark (4 boxes × ½ = 2 marks)

Examiner tip: The tangent at any point of a circle is perpendicular to the radius through that point; this is what makes $\triangle OAP$ right-angled.

Q.2 (B) Solve any four of the following sub-questions. **[8]**

(i) In the figure, in △XYZ, ∠XYZ = 90°, ∠XZY = 30° and XZ = 14. Find XY and YZ.



Answer (2 marks)

In △XYZ, ∠Y = 90°, ∠Z = 30°, ∴ ∠X = 60°.

∴ △XYZ is a 30°–60°–90° triangle.

By the 30°–60°–90° theorem,

XY = ½ × XZ ...(side opposite 30°)

∴ XY = ½ × 14 = 7

YZ = (√3/2) × XZ ...(side opposite 60°)

∴ YZ = (√3/2) × 14 = 7√3

∴ XY = 7 and YZ = 7√3

Marking: Identifying 30°–60°–90° triangle / theorem – ½ mark · XY = 7 – ½ mark · Formula for YZ – ½ mark · YZ = 7√3 – ½ mark

Examiner tip: Students often swap the sides: the side opposite 30° is half the hypotenuse.

(ii) Find the co-ordinates of the point P which divides the line segment joining A(−2, 5) and B(8, −5) internally in the ratio 2 : 3.

Answer (2 marks)

Let P(x, y) divide seg AB internally in the ratio m : n = 2 : 3.

$A(x_1, y_1) = (-2, 5)$, $B(x_2, y_2) = (8, -5)$

By section formula,

$x = (mx_2 + nx_1)/(m + n) = (2 \times 8 + 3 \times (-2))/(2 + 3) = (16 - 6)/5 = 10/5 = 2$

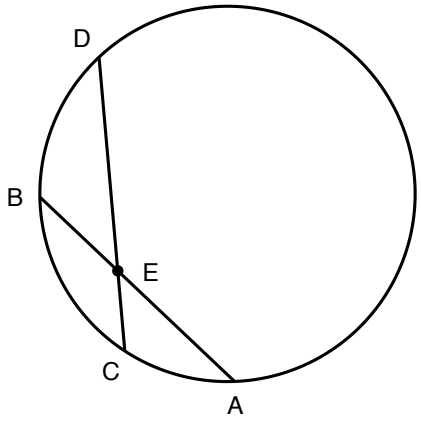
$y = (my_2 + ny_1)/(m + n) = (2 \times (-5) + 3 \times 5)/(2 + 3) = (-10 + 15)/5 = 5/5 = 1$

∴ The co-ordinates of point P are (2, 1).

Marking: Section formula – ½ mark · Substitution – ½ mark · x = 2 – ½ mark · y = 1 – ½ mark

Examiner tip: Multiply m with the co-ordinates of B (the second point), not of A.

(iii) In the figure, chords AB and CD of a circle intersect each other at point E inside the circle. If AE = 6, EB = 4 and CE = 3, find ED.



Answer (2 marks)

Chords AB and CD intersect at E inside the circle.

$\therefore$ AE × EB = CE × ED ...(Theorem of internal division of chords)

$\therefore$ 6 × 4 = 3 × ED

$\therefore$ 24 = 3 × ED

$\therefore$ ED = 24/3 = 8

$\therefore$ ED = 8

Marking: Correct theorem with statement AE × EB = CE × ED – 1 mark · Substitution – ½ mark · ED = 8 – ½ mark

Examiner tip: Each product uses the two parts of the SAME chord. The textbook names this the theorem of internal division of chords (also called the theorem of chords intersecting inside the circle).

(iv) The radius of a circle is 12 cm. Find the area of a sector of this circle whose central angle is 60°. (π = 3.14)

Answer (2 marks)

r = 12 cm, θ = 60°

Area of sector = $(\theta/360) \times \pi r^2$

= (60/360) × 3.14 × 12 × 12

= (1/6) × 3.14 × 144

= 3.14 × 24

$\therefore$ Area of sector = 75.36 cm^2

Marking: Formula – ½ mark · Substitution – ½ mark · Simplification – ½ mark · Answer with unit – ½ mark

Examiner tip: Write the unit cm^2 with the final answer.

(v) $\triangle ABC \sim \triangle PQR$. $A(\triangle ABC) = 81\ cm^2$ and $A(\triangle PQR) = 144\ cm^2$. If BC = 9 cm, find QR.

Answer (2 marks)

$\triangle ABC \sim \triangle PQR$ ...(Given)

$\therefore A(\triangle ABC)/A(\triangle PQR) = BC^2/QR^2$ ...(Theorem of areas of similar triangles)

$\therefore 81/144 = 9^2/QR^2$

$\therefore 9/12 = 9/QR$ ...(Taking square roots)

$\therefore$ QR = 12 cm

Marking: Correct theorem / ratio – 1 mark · Substitution and square root – ½ mark · QR = 12 cm – ½ mark

Examiner tip: Areas are in the ratio of the SQUARES of corresponding sides; take square roots before comparing sides.

Q.3 (A) Complete any one activity of the following and rewrite it. **[3]**

(i) In the figure, □ABCD is a rhombus. Its diagonals AC and BD intersect at point O. Complete the following activity to prove that $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$.

Activity: Diagonals of a rhombus are perpendicular bisectors of each other.

∴ In △AOB, ∠AOB = ☐, AO = ½ AC and BO = ☐

$AB^2 = AO^2 +$ ☐ ...(Pythagoras theorem)

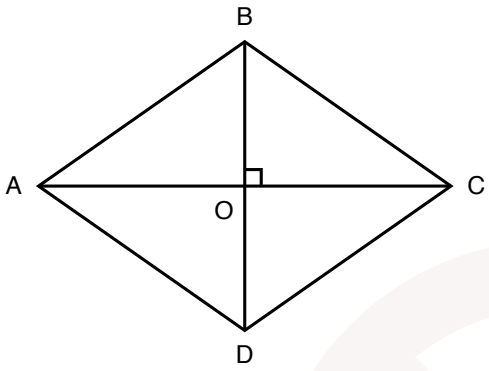
$\therefore AB^2 = (½\ AC)^2 + (½\ BD)^2$

$\therefore AB^2 =$ ☐/4

$\therefore 4AB^2 = AC^2 + BD^2$

But AB = BC = CD = DA ...(☐)

$\therefore AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$



Answer (3 marks)

Diagonals of a rhombus are perpendicular bisectors of each other.

∴ In △AOB, ∠AOB = **90°**, AO = ½ AC and BO = **½ BD**

$AB^2 = AO^2 +$ **BO^2** ...(Pythagoras theorem)

$\therefore AB^2 = (½\ AC)^2 + (½\ BD)^2$

$\therefore AB^2 =$ **$(AC^2 + BD^2)$**/4

$\therefore 4AB^2 = AC^2 + BD^2$

But AB = BC = CD = DA ...(**Sides of a rhombus are congruent**)

$\therefore AB^2 + BC^2 + CD^2 + DA^2 = 4AB^2 = AC^2 + BD^2$

Hence proved.

Marking: ∠AOB = 90° – ½ mark · BO = ½ BD – ½ mark · BO^2 – ½ mark · $(AC^2 + BD^2)$ – ½ mark · Reason: sides of a rhombus are congruent – 1 mark

Examiner tip: Write 'Hence proved' at the end and do not skip the reason for AB = BC = CD = DA.

(ii) Complete the following activity to prove that $\sin\theta/(1 - \cos\theta) - \sin\theta/(1 + \cos\theta) = 2\cot\theta$.

Activity: LHS = $\sin\theta/(1 - \cos\theta) - \sin\theta/(1 + \cos\theta)$

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

$= (\sin\theta + \sin\theta\cos\theta - \sin\theta + \sin\theta\cos\theta)/(1 -$ ☐)

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

$= 2\cos\theta/\sin\theta$

= 2 ☐

= RHS

Answer (3 marks)

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

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

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

= **2 sin θ cos θ**/sin²θ ...(∵ 1 − cos²θ = **sin²θ**)
= 2 cos θ/sin θ
= 2 **cot θ**
= RHS
∴ sin θ/(1 − cos θ) − sin θ/(1 + cos θ) = 2 cot θ. Hence proved.

Marking: cos²θ – ½ mark · 2 sin θ cos θ – 1 mark · sin²θ – 1 mark · cot θ – ½ mark

Examiner tip: Use (1 − cos θ)(1 + cos θ) = 1 − cos²θ = sin²θ; sign errors while opening brackets are the most common slip.

Q.3 (B) Solve any two of the following sub-questions. **[6]**

(i) Construct △ABC in which BC = 6 cm, ∠ABC = 60° and AB = 4.5 cm. Construct △PBQ such that △ABC ~ △PBQ and BC/BQ = 3/4.

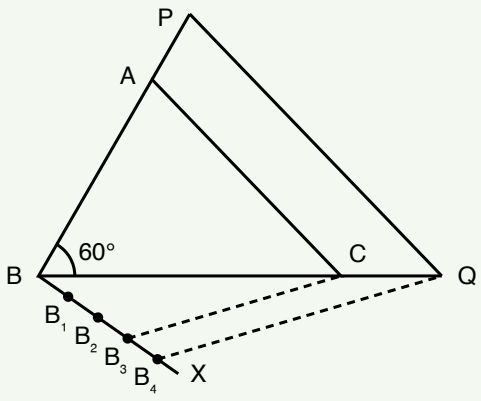
Answer (3 marks)

Rough figure and analysis: △ABC ~ △PBQ, ∴ ∠ABC = ∠PBQ = 60° and AB/PB = BC/BQ = AC/PQ = 3/4. So BQ = (4/3) × 6 = 8 cm and PB = (4/3) × 4.5 = 6 cm. Points P and Q lie on rays BA and BC respectively.

Steps of construction:

1. Draw seg BC = 6 cm.
2. At B, draw ray BA making ∠ABC = 60° and mark A such that AB = 4.5 cm. Join AC. △ABC is ready.
3. Draw ray BX making an acute angle with BC on the side opposite to A.
4. Starting from B, mark 4 equal parts on ray BX: B_1, B_2, B_3, B_4.
5. Join B_3C.
6. Through B_4, draw a line parallel to B_3C, meeting ray BC at Q.
7. Through Q, draw a line parallel to CA, meeting ray BA at P.

△PBQ is the required triangle (BQ = 8 cm, BP = 6 cm, ∠PBQ = 60°).



Marking: Rough figure with analysis – 1 mark · Construction of △ABC – 1 mark · Construction of △PBQ (equal parts and parallel lines) – 1 mark

Examiner tip: Do not erase the construction marks; draw the rough figure first and show the 4 equal parts on ray BX.

(ii) Show that the points P(−2, 1), Q(1, 5) and R(5, 2) are the vertices of an isosceles right-angled triangle.

Answer (3 marks)

By distance formula,
PQ = √[(1 − (−2))² + (5 − 1)²] = √(9 + 16) = √25 = 5
QR = √[(5 − 1)² + (2 − 5)²] = √(16 + 9) = √25 = 5

$PR = \sqrt{[(5-(-2))^2 + (2-1)^2]} = \sqrt{(49+1)} = \sqrt{50}$

$PQ = QR$ ...(I)

$PQ^2 + QR^2 = 25 + 25 = 50 = PR^2$

$\therefore$ By the converse of Pythagoras theorem, $\triangle PQR$ is right-angled at Q. ...(II)

From (I) and (II), P, Q and R are the vertices of an isosceles right-angled triangle.

Marking: PQ, QR and PR (½ mark each) – 1½ marks · Showing $PQ = QR$ – ½ mark · $PQ^2 + QR^2 = PR^2$ with converse of Pythagoras theorem and conclusion – 1 mark

Examiner tip: Name the converse of Pythagoras theorem while concluding the right angle.

(iii) In $\triangle ABC$, seg AD is a median. If AB = 11, AC = 17 and BC = 12, find AD.

Answer (3 marks)

Seg AD is a median of $\triangle ABC$.

$\therefore$ D is the midpoint of BC, so $BD = \frac{1}{2} \times BC = \frac{1}{2} \times 12 = 6$

By Apollonius theorem,

$AB^2 + AC^2 = 2AD^2 + 2BD^2$

$\therefore 11^2 + 17^2 = 2AD^2 + 2 \times 6^2$

$\therefore 121 + 289 = 2AD^2 + 72$

$\therefore 410 - 72 = 2AD^2$

$\therefore 2AD^2 = 338$

$\therefore AD^2 = 169$

$\therefore AD = 13$

Marking: BD = 6 – ½ mark · Apollonius theorem statement – 1 mark · Substitution – ½ mark · AD = 13 – 1 mark

Examiner tip: Use BD (half of BC), not BC, in Apollonius theorem.

(iv) A solid metal sphere of radius 6 cm is melted and recast into solid cones, each of radius 3 cm and height 4 cm. How many cones are made?

Answer (3 marks)

Radius of sphere R = 6 cm; radius of cone r = 3 cm, height h = 4 cm.

Volume of sphere $= (4/3)\pi R^3 = (4/3)\pi \times 6^3 = (4/3)\pi \times 216 = 288\pi$ cm^3

Volume of one cone $= (1/3)\pi r^2 h = (1/3)\pi \times 3^2 \times 4 = 12\pi$ cm^3

Number of cones = Volume of sphere/Volume of one cone $= 288\pi/12\pi = 24$

$\therefore$ 24 cones are made.

Marking: Volume of sphere – 1 mark · Volume of one cone – 1 mark · Number of cones = 24 – 1 mark

Examiner tip: Keep π as it is; it cancels, so no long multiplication is needed.

Q.4 Solve any two of the following sub-questions. **[8]**

(i) Prove that the opposite angles of a cyclic quadrilateral are supplementary.

Answer (4 marks)

Given: $\square ABCD$ is a cyclic quadrilateral.

To prove: $\angle BAD + \angle BCD = 180°$ and $\angle ABC + \angle ADC = 180°$

Proof: Arc BCD is intercepted by the inscribed angle $\angle BAD$.

$\therefore \angle BAD = \frac{1}{2}$ m(arc BCD) ...(I) (Inscribed angle theorem)

Arc BAD is intercepted by the inscribed angle $\angle BCD$.

$\therefore \angle BCD = \frac{1}{2}$ m(arc BAD) ...(II) (Inscribed angle theorem)

Adding (I) and (II),

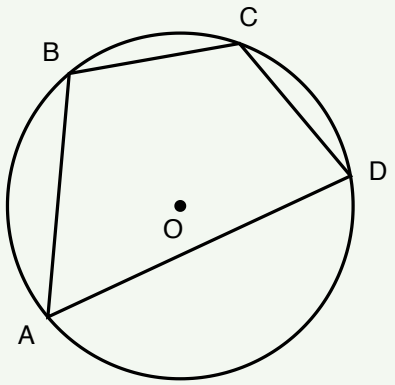
$\angle BAD + \angle BCD = \frac{1}{2}$ [m(arc BCD) + m(arc BAD)]

$= \frac{1}{2} \times 360°$ ...(Arc BCD and arc BAD together make the complete circle)

$\therefore \angle BAD + \angle BCD = 180°$

Similarly, ∠ABC + ∠ADC = 180° (or, the sum of all angles of a quadrilateral is 360°, so ∠ABC + ∠ADC = 360° − 180° = 180°).

Hence, the opposite angles of a cyclic quadrilateral are supplementary.

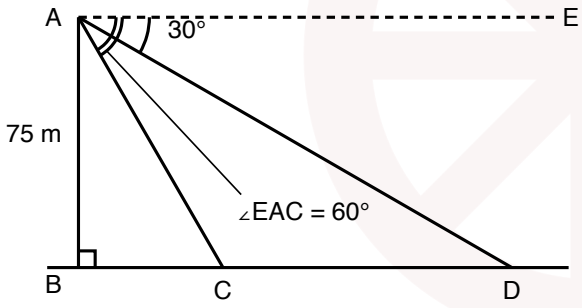


Marking: Figure – 1 mark · Given and To prove – 1 mark · Inscribed angle relations (I) and (II) – 1 mark · Adding, using arc sum 360°, conclusion for both pairs – 1 mark

Examiner tip: The figure is compulsory for a theorem proof. Name the intercepted arcs correctly (three letters).

(ii) From the top of a lighthouse 75 m high, the angles of depression of two boats on the same side of the lighthouse and in line with its foot are 60° and 30°. Find the distance between the two boats. (√3 = 1.73)

(In the figure, AB is the lighthouse, C and D are the boats and AE is the horizontal line through A.)



Answer (4 marks)

In the figure, AB is the lighthouse, AB = 75 m. C and D are the boats. AE is the horizontal line through A.

∠EAC = 60° and ∠EAD = 30° are the angles of depression.

AE ∥ BD, ∴ ∠ACB = ∠EAC = 60° and ∠ADB = ∠EAD = 30° ...(Alternate angles)

In right-angled △ABC,

tan 60° = AB/BC

∴ √3 = 75/BC

∴ BC = 75/√3 = 25√3 m

In right-angled △ABD,

tan 30° = AB/BD

∴ 1/√3 = 75/BD

∴ BD = 75√3 m

CD = BD − BC = 75√3 − 25√3 = 50√3

∴ CD = 50 × 1.73 = 86.5 m

∴ The distance between the two boats is 86.5 m.

Marking: Figure / alternate angles – 1 mark · BC = $25\sqrt{3}$ m – 1 mark · BD = $75\sqrt{3}$ m – 1 mark · CD = $50\sqrt{3}$ = 86.5 m – 1 mark

Examiner tip: The angle of depression is measured from the horizontal at the observer; transfer it to the boat using alternate angles.

(iii) Draw a circle with centre O and radius 3 cm. Draw tangents PA and PB to the circle from an external point P such that ∠APB = 60°.

Answer (4 marks)

Analysis: In □OAPB, ∠OAP = ∠OBP = 90° ...(Tangent theorem)

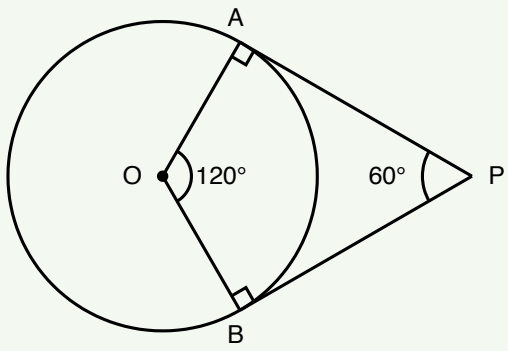
∴ ∠AOB = 360° − (90° + 90° + 60°) = 120°

(Also, in △OAP, ∠OPA = 30°, so OP = 2 × OA = 6 cm.)

Steps of construction:

1. Draw a circle with centre O and radius 3 cm.
2. Draw radius OA.
3. Draw radius OB such that ∠AOB = 120°.
4. At A, draw a line perpendicular to radius OA.
5. At B, draw a line perpendicular to radius OB.
6. Name the point of intersection of these two lines as P.

PA and PB are the required tangents with ∠APB = 60°. (On measuring, OP = 6 cm.)



Marking: Analysis: ∠AOB = 120° – 1 mark · Circle with radius 3 cm and radii with ∠AOB = 120° – 1 mark · Perpendiculars at A and B – 1 mark · Tangents meeting at P, labelled – 1 mark · Any other correct construction (e.g. using the midpoint of OP) gets full marks.

Examiner tip: Write the analysis (rough figure with ∠AOB = 120°) before the construction; it carries marks.

Q.5 Solve any one of the following sub-questions. **[3]**

(i) At a certain time of the day, a girl 1.5 m tall casts a shadow 2 m long on level ground. At the same time, a vertical pole casts a shadow 12 m long.
(a) Draw a figure from the given information.
(b) Name the similar triangles and write the test of similarity.
(c) Find the height of the pole.

Answer (3 marks)

(a) In the figure, AB is the pole and BC its shadow; DE is the girl and EF her shadow. DE = 1.5 m, EF = 2 m, BC = 12 m.

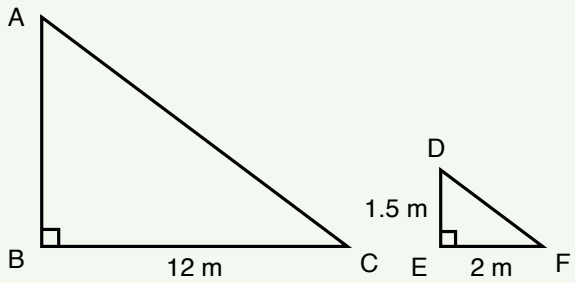
(b) In △ABC and △DEF,

∠ABC = ∠DEF = 90° ...(Pole and girl are vertical)

∠ACB = ∠DFE ...(Sun's rays are parallel at the same time, so the angles of elevation are equal)

∴ △ABC ~ △DEF ...(AA test of similarity)

(c) ∴ AB/DE = BC/EF …(Corresponding sides of similar triangles are in proportion)
∴ AB/1.5 = 12/2
∴ AB = 1.5 × 6 = 9
∴ The height of the pole is 9 m.



Marking: (a) Correct figure – 1 mark · (b) Similar triangles with AA test – 1 mark · (c) Height of pole = 9 m – 1 mark

Examiner tip: Write the correspondence in the right order (△ABC ~ △DEF) so that the proportion of sides is correct.

(ii) A family stores water in a cylindrical tank of inner diameter 1.4 m and height 2 m.
(a) Find the radius of the tank and write the formula for its volume.
(b) Find the capacity of the tank in litres.
(c) If the family uses 616 litres of water every day, for how many days will one full tank last? (π = 22/7, 1 m^3 = 1000 litres)

Answer (3 marks)
(a) Radius r = 1.4/2 = 0.7 m, height h = 2 m.
Volume of cylinder = $\pi r^2 h$
(b) Volume = 22/7 × 0.7 × 0.7 × 2 = 22 × 0.1 × 0.7 × 2 = 3.08 m^3
Capacity = 3.08 × 1000 = 3080 litres
(c) Number of days = 3080/616 = 5
∴ One full tank lasts for 5 days.

Marking: (a) Radius and formula – 1 mark · (b) Capacity 3080 litres – 1 mark · (c) 5 days – 1 mark

Examiner tip: Use the radius (0.7 m), not the diameter, and convert m^3 to litres before dividing.

All the best for your exam!