Year 10A area of a triangle worksheet

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Name: _____ Date: _____

Question 1

Two fences meet at a corner post. One fence is 23 m long and the other is 18 m long. The angle between the fences at the corner post is 74°. A third fence is to be built to join the far ends of the two fences, enclosing a triangular paddock. Find the area of the triangular paddock, correct to the nearest square metre, and the length of the third fence, correct to the nearest metre.

Answer: _____

Question 2

Use a calculator.

(a) A triangular paddock PQR has PQ = 85 m, PR = 62 m and angle QPR = 48°. Find its area, correct to the nearest square metre.

(b) Another triangle has two sides of 80 m and 50 m and an area of 1500 m². Find the two possible sizes of the angle between these sides, correct to one decimal place.

Answer: _____

Question 3

A triangular garden bed has two sides of 9 m and 14 m, with an angle of 38° between them. Find its area, correct to 1 decimal place.

Answer: _____

Question 4

Find the area of a triangle with two sides of 10 cm and 12 cm and an included angle of 30°.

Answer: _____

Question 5

A triangular paddock has two sides of 120 m and 150 m, with an angle of 75° between them.

(a) Find the area of the paddock in square metres, correct to the nearest square metre.

(b) Convert your answer to hectares, correct to two decimal places (1 ha = 10,000 m²).

Answer: _____

Question 6

Triangle PQR has PQ = 8 cm, PR = 12 cm and an area of 24 cm^2. Find the two possible sizes of angle QPR.

Answer: _____

Year 10A area of a triangle: answers and worked solutions

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Question 1

Key idea: Use the area formula Area = ½absin C when two sides and the included angle are known, then use the cosine rule to find the third side.

1. Label the two known sides a = 23 m, b = 18 m, and the included angle C = 74°. 2. Calculate the area:\ Area = ½ × 23 × 18 × sin 74° = ½ × 23 × 18 × 0.9613 ≈ 199.0 ≈ 199 m² 3. Apply the cosine rule to find the third side c:\ $c^2 = 23^2 + 18^2 - 2 \times 23 \times 18 \times \cos 74°$ = 529 + 324 - 828 × 0.2756 = 853 - 228.2 = 624.8 4. Take the square root:\ c = √(624.8) ≈ 25 m

Answer: Area ≈ 199 m², third fence ≈ 25 m

Question 2

Key idea: Area = ½absin C, where C is the angle between sides a and b. Since sinθ = sin(180° - θ), an area can give an acute and an obtuse angle.

(a) 1. A = ½ × 85 × 62 × sin 48° 2. = 2635 × 0.7431… = 1958.18… ≈ 1958 m²

(b) 1. 1500 = ½ × 80 × 50 × sin C = 2000sin C 2. sin C = 1500/2000 = 0.75 3. C = $\sin^{-1}(0.75)$ = 48.590…° ≈ 48.6° 4. or C = 180° - 48.590…° = 131.409…° ≈ 131.4°

Answer: (a) 1958 m² (b) 48.6° or 131.4°

Question 3

Key idea: Area = ½absin C, where C is the angle between sides a and b.

1. Area = ½ × 9 × 14 × sin 38° 2. = 63 × 0.6156… = 38.78… 3. Area ≈ 38.8 m²

Answer: 38.8 m²

Question 4

Answer: 30 cm² (½ × 10 × 12 × sin 30°)

Question 5

Answer: (a) 8693 m² (½ × 120 × 150 × sin 75°) (b) 0.87 ha

Question 6

Answer: 30° or 150° (½ × 8 × 12 × sin θ = 24, so sin θ = ½)