Year 10 area and perimeter worksheet

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Name: _____ Date: _____

Question 1

Convert each length to the unit shown in brackets.

(a) 3.75 km (m)

(b) 48 mm (cm)

(c) 0.62 m (mm)

Answer: _____

Question 2

Find the area of a trapezium with parallel sides of 8.4 cm and 13.6 cm and a perpendicular height of 5 cm.

Answer: _____

Question 3

Use a calculator. A shape is made from a rectangle measuring 12 cm by 5 cm with a semicircle attached to one of its 5 cm sides, so that this 5 cm side is the diameter of the semicircle. Find the perimeter of the shape, correct to two decimal places.

Answer: _____

Question 4

Use a calculator. Find the area of a circle with a diameter of 18 cm, correct to one decimal place.

Answer: _____

Question 5

Use a calculator. A sector of a circle has radius 9 cm and a centre angle of 140°.

(a) Find the arc length, correct to two decimal places.

(b) Find the perimeter of the sector, correct to two decimal places.

Answer: _____

Question 6

Convert each area to the unit shown in brackets.

(a) 3.2 m² (cm²)

(b) 45 000 m² (hectares)

Answer: _____

Question 7

A right-angled triangle has a hypotenuse of 26 cm and one shorter side of 10 cm. Find the length of the third side and the perimeter of the triangle.

Answer: _____

Question 8

Use a calculator. A rectangular backyard measures 15 m by 8 m. It contains a circular pond of radius 1.5 m, and the rest of the backyard is to be covered with turf.

(a) Find the area to be turfed, correct to two decimal places.

(b) Turf is sold only in whole square metres at $12.50 per square metre. Find the cost of the turf needed.

(c) A paved path 1 m wide is to be built around the outside of the backyard. Find the area of the path.

Answer: _____

Question 9

Use a calculator. The inside lane of a running track is made of two straight sections, each 84.39 m long, joined at each end by a semicircle of radius 36.8 m.

(a) Find the total length of the inside lane, correct to one decimal place.

(b) The next lane out has semicircles of radius 38.02 m and the same straight sections. How much further is one lap of this lane than one lap of the inside lane? Give your answer correct to two decimal places.

(c) Explain why runners in outer lanes start further ahead in a one-lap race.

Answer: _____

Question 10

Find the area of a parallelogram with base 12.5 cm and perpendicular height 8 cm.

Answer: _____

Year 10 area and perimeter: answers and worked solutions

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Question 1

Key idea: $1\ \text{km} = 1000\ \text{m}$, $1\ \text{m} = 100\ \text{cm}$ and $1\ \text{cm} = 10\ \text{mm}$. Multiply when converting to a smaller unit, divide when converting to a larger unit.

(a) 1. $3.75 \times 1000 = 3750$ m

(b) 1. $48 \div 10 = 4.8$ cm

(c) 1. $1\ \text{m} = 1000\ \text{mm}$, so $0.62 \times 1000 = 620$ mm

Answer: (a) 3750 m (b) 4.8 cm (c) 620 mm

Question 2

Key idea: Area of a trapezium = $\frac{1}{2}(a + b)h$, where a and b are the parallel sides.

1. $a + b = 8.4 + 13.6 = 22$ 2. $A = \frac{1}{2} \times 22 \times 5 = 55$

Answer: 55 cm²

Question 3

Key idea: The perimeter is the distance around the outside only. The 5 cm side shared with the semicircle is inside the shape, so it is not counted.

1. Straight edges on the outside: $12 + 5 + 12 = 29$ cm. 2. Curved edge (half a circle of diameter 5 cm): $\frac{1}{2} \times \pi \times 5 = 7.853\ldots$ cm 3. Perimeter $= 29 + 7.853\ldots = 36.853\ldots \approx 36.85$ cm.

Answer: 36.85 cm

Question 4

Key idea: Area of a circle = πr^2. Halve the diameter to get the radius first.

1. $r = 18 \div 2 = 9$ cm 2. $A = \pi \times 9^2 = 81\pi = 254.469\ldots \approx 254.5$ cm²

Answer: 254.5 cm²

Question 5

Key idea: Arc length = $\frac{\theta}{360°} \times 2\pi r$. The perimeter of a sector is the arc plus two radii.

(a) 1. $l = \frac{140}{360} \times 2\pi \times 9 = 7\pi = 21.991\ldots \approx 21.99$ cm

(b) 1. $P = 21.991\ldots + 9 + 9 = 39.991\ldots \approx 39.99$ cm

Answer: (a) 21.99 cm (b) 39.99 cm

Question 6

Key idea: Square the length conversion factor: 1 $m^2 = 100^2 = 10{,}000$ cm^2. Also 1 ha = 10,000 m^2.

(a) 1. $3.2 \times 10{,}000 = 32{,}000$ cm^2

(b) 1. $45{,}000 \div 10{,}000 = 4.5$ ha

Answer: (a) 32 000 cm^2 (b) 4.5 ha

Question 7

Key idea: Use Pythagoras' theorem, $a^2 + b^2 = c^2$, where c is the hypotenuse.

1. $b^2 = 26^2 - 10^2 = 676 - 100 = 576$ 2. $b = \sqrt{576} = 24$ cm 3. Perimeter = 26 + 10 + 24 = 60 cm

Answer: The third side is 24 cm and the perimeter is 60 cm.

Question 8

Key idea: The turfed area is the rectangle minus the circle. The path area is the large outer rectangle minus the backyard.

(a) 1. Rectangle: $15 \times 8 = 120$ m^2. 2. Pond: $\pi \times 1.5^2 = 2.25\pi = 7.068\ldots$ m^2. 3. Turf area: $120 - 7.068\ldots = 112.931\ldots \approx 112.93$ m^2.

(b) 1. Round up to whole square metres: 113 m^2. 2. Cost: $113 \times 12.50 = 1412.50$, so $1412.50.

(c) 1. Adding 1 m on every side gives an outer rectangle of (15 + 2) m by (8 + 2) m, that is 17 m by 10 m. 2. Outer area: $17 \times 10 = 170$ m^2. 3. Path area: $170 - 120 = 50$ m^2.

Answer: (a) 112.93 m^2 (b) $1412.50 (c) 50 m^2

Question 9

Key idea: The two semicircles together make one full circle, so a lap is 2 × straight + $2\pi r$.

(a) 1. Straights: $2 \times 84.39 = 168.78$ m. 2. Curves: $2\pi \times 36.8 = 231.221\ldots$ m. 3. Total: $168.78 + 231.221\ldots = 400.001\ldots \approx 400.0$ m.

(b) 1. The straights are the same, so only the curves differ. 2. Difference = $2\pi \times 38.02 - 2\pi \times 36.8 = 2\pi \times 1.22 = 7.665\ldots \approx 7.67$ m.

(c) 1. A lap of the next lane is about 7.67 m longer because its curves have a larger radius. 2. If every runner started on the same line, outer-lane runners would run further. Staggering the start (by about 7.67 m per lane) makes each runner cover the same distance.

Answer: (a) 400.0 m (b) 7.67 m (c) Outer lanes have larger curves and are longer, so their starts are moved forward to make every runner cover the same distance.

Question 10

Key idea: Area of a parallelogram is base times perpendicular height.

1. Area = base × height. 2. = 12.5 × 8 = 100 cm^2.

Answer: 100 cm^2