Unit 16 · Circle

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 28

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 Coins in a box

ANSWER A · 3

i. Each coin is $2 \times 2 = 4$ cm across (its diameter). Length $3 \times 4 =$ **12 cm**, breadth **4 cm**.
ii. Length **12 cm**, breadth $2 \times 4 =$ **8 cm**.
iii. Each coin is $2 \times 1.5 = 3$ cm across: $30 \div 3 =$ **10 coins**.

MARKING SCHEME

✓ 12 cm by 4 cm.
✓ 12 cm by 8 cm.
✓ 10 coins.

2 Two circles, one center

ANSWER A · 3

i. $5 - 3 =$ **2 cm**.
ii. The diameter: $2 \times 5 =$ **10 cm**.
iii. **No.** The longest chord of the small circle is its diameter, $2 \times 3 = 6$ cm, and 7 cm is longer than that.

MARKING SCHEME

✓ 2 cm.
✓ 10 cm, the diameter.
✓ No, the longest chord is 6 cm.

3 Spot the error

ANSWER U · 3

i. The distance from the needle to the pencil is the **radius**: 6 cm. The diameter is twice that, **12 cm**.
ii. **No.** Only points exactly 4 cm (the radius) from the center are on the circle: **Q is on it**, P is **inside** and R is **outside**.
iii. Any chord that does **not pass through the center** is not a diameter, such as a short chord near the edge of the circle.

MARKING SCHEME

✓ 6 cm is the radius.
✓ Q on, P inside, R outside.
✓ A chord that misses the center.

4 Two goats

ANSWER A · 4

i. Each patch is a **circle** with the peg at its center and a radius of 3 m (3 cm on the drawing).
ii. **Yes.** The two circles overlap: 3 m + 3 m = 6 m is more than the 5 m between the pegs.
iii. **No.** 2 m + 2 m = 4 m is less than 5 m: the circles don't meet.
iv. Half of 5 m: **2.5 m** each. Then the two circles just touch, halfway between the pegs.

MARKING SCHEME

✓ Circles of radius 3 m round the pegs.
✓ Yes, the circles overlap.
✓ No, 4 m is less than 5 m.
✓ 2.5 m.

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5 Stepping round a circle

ANSWER A · 4

i. **6 marks**: the radius fits round exactly 6 times.
ii. Each side is **3 cm**, the radius. It is a shape with six equal sides (a regular hexagon).
iii. 360° ÷ 6 = **60**°, as in the 60° construction of Unit 14.
iv. A triangle with three equal sides: an **equilateral triangle**.

MARKING SCHEME

- ✓ 6 marks.
- ✓ Six sides of 3 cm.
- ✓ 60°.
- ✓ An equilateral triangle.

6 Cutting a round cake

ANSWER A · 4

i. A **semicircle**: the cut is a diameter.
ii. **6 pieces**, each 360° ÷ 6 = **60**° at the center.
iii. Each cut makes 2 pieces, so **6 cuts**. Each piece is 360° ÷ 12 = **30**°.
iv. A **sector**: the part of a circle between two radii.

MARKING SCHEME

- ✓ A semicircle.
- ✓ 6 pieces, 60°.
- ✓ 6 cuts, 30°.
- ✓ A sector.

7 Square in a circle

ANSWER A · 3

i. All four sides are equal and every angle is 90°: a **square**.
ii. Both are **diameters** of the circle, 8 cm long, and they cross at O at a right angle.
iii. About **5.7 cm** (5.66 cm).

MARKING SCHEME

- ✓ A square.
- ✓ Both are diameters, 8 cm, at right angles.
- ✓ About 5.7 cm.

8 Think: find the lost center

ANSWER HA · 4

i. The center is the **same distance** from P and from Q (both are radii), and every point that is the same distance from P and Q lies on the perpendicular bisector of PQ (Unit 14).
ii. Draw a **second chord**, RS, in another direction, and its perpendicular bisector. The center is on both bisectors, so it is **where they cross**.
iii. Measure from the center to any point of the circle.
iv. Check: the distance from the center to several points of the circle should be the same each time.

MARKING SCHEME

- ✓ The center is equally far from P and Q.
- ✓ A second chord's bisector; the center is where they cross.
- ✓ Center to the circle.
- ✓ The check that every radius measures the same.

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See it at Science Playground

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- **The Unit Circle** (exhibit): Its radius is 1 unit, so the diameter from 180° to 0° is 2 units. The part between the 0° and 30° radii is a sector.
- **String Art** (exhibit): Every thread joins two pins on the circle, so each one is a chord. The threads that pass near the middle are the longest, almost diameters.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	3	21	4	**28**