

1

$$3kx^2 + (k+8)x + 3 = 0$$

has two distinct real roots.

[4]

This image shows a full page of white paper with horizontal dotted lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

5 (a) Show that $\tan^4 \theta - 1 \equiv \frac{1 - 2 \cos \theta}{\cos^4 \theta}$.

[3]

[illegible]

(b) Hence solve the equation $\cos^2\theta(\tan^4\theta - 1) = 7$ for $0^\circ < \theta < 180^\circ$. [4]

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the entire width of the page. There are no margins, text, or other markings present.

6 Functions f and g are defined by

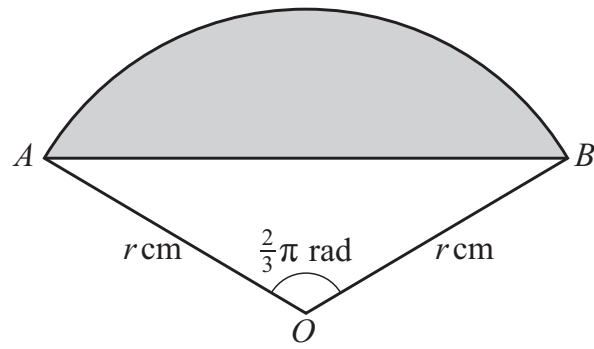
$$f(x) = (x + 3)^2 - 12 \quad \text{for } x \geq 0,$$

$$g(x) = 2x - 5 \quad \text{for } x \in \mathbb{R}.$$

(a) State the range of f . [1]

(b) Find an expression for $f^{-1}(x)$. [2]

(c) Solve the equation $gf(x) = 69$. [4]



The diagram shows a sector of a circle with centre O and radius r cm. The shaded region is bounded by the chord AB and the arc AB . The size of angle AOB is $\frac{2}{3}\pi$ radians.

- (a) Show that the area of the shaded region is approximately $0.614r^2 \text{ cm}^2$. [2]

Handwriting practice sheet with 20 horizontal dotted lines for writing.

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It is given that the radius of the circle is increasing at a rate of 0.4 cm s^{-1} .

- (b) (i)** Find the rate of increase of the area of the shaded region at the instant when $r = 20$. Give your answer correct to 2 significant figures.

[3]

- (ii) Find the rate of increase of the length of the arc AB . Give your answer correct to 2 significant figures. [3]

[3]

- 10** A circle has equation $x^2 + y^2 + 4y - 21 = 0$ and a straight line has equation $2x + y - 8 = 0$. The line intersects the circle at two points.

(a) Find the coordinates of these two points of intersection.

[4]

[illegible]

- (b)** The circle has centre C and the two points of intersection are denoted by A and B .

Find the area of the triangle ABC .

[3]