

Revision for Class Test

1 Factorise completely each of the following expressions:

(a) $x^2 - 4p^2 + 4y^2 - 4xy$

(b) $(a^3 + b^3)^3 - (a^3 - b^3)^3$

2 (a) Simplify $\frac{a^3+1}{a+1} \times \frac{a^3-1}{a^2+2a+1} \div \frac{a^2-a}{a+1}$ into a single fraction.

(b) Simplify $\frac{3}{1-\sqrt{m+1}} + \frac{3}{\sqrt{m+1}+1}$ into a single fraction.

3 Solve for x when $\sqrt{x-2} + 3 = 2\sqrt{x+1}$.

4 By rationalising the denominator, simplify $\frac{2-\sqrt{3}}{(\sqrt{2}-\sqrt{3})^2} - \frac{3-\sqrt{2}}{(\sqrt{3}+\sqrt{2})^2}$.

5 Solve for x when

(a) $3^{x+1} = 18(3^{-x}) + 25$

(b) $\sqrt{x^2 + 2\sqrt{2x+8}} + 1 = x + 1$

6 Determine the value(s) or range of values of k when

(a) $kx^2 + 6 = 2(2x + k)$ has two distinct real roots,

(b) $kx(2-x) - 2$ is always greater than $3x^2 + k$ for all real values of x .

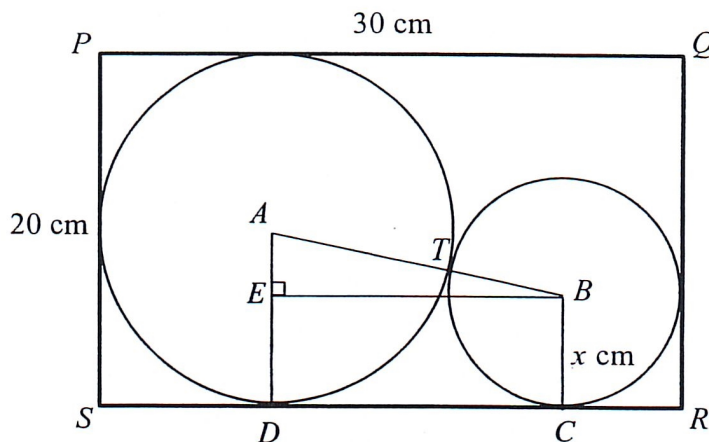
7 Show that, regardless of the value of k , the equation $2kx + 2k + 3 = x^2$ will always have two real and distinct solutions.

8 A quadratic graph has a minimum value $y = -18$ and the x -intercepts are 4 and -2 .

(i) Write down the coordinates of the minimum point.

(ii) Determine the equation of the graph in the form $y = ax^2 + bx + c$.

- 9 The diagram below shows a rectangle $PQRS$ with sides 30cm and 20cm.



Two circles are drawn inside the rectangle such that they touch each other at T and both circles touch the line RS at C and D as shown. The point E is the foot of the perpendicular from B to AD . The radius of the smaller circle, centred B , is x cm.

- (i) Form an equation in x and show that it simplifies to $x^2 - 80x + 400 = 0$.
- (ii) Hence find the value of x and the area of the small circle, correct to 3 significant figures.

Answer Key

- 1 (a) $(x - 2y - 2p)(x - 2y + 2p)$ (b) $2b^3(3a^6 + b^6)$
- 2 (a) $\frac{a^4 + a^2 + 1}{a^2 + a}$ (b) $-\frac{6}{m}$
- 3 3
- 4 $10\sqrt{6} - 9\sqrt{3} - \sqrt{2} - 5$
- 5 (a) $x = 2$ (b) $x = 4$
- 6 (a) $k < 1$ or $k > 2$; $k \neq 0$ (b) no value of k
- 8 (i) $(1, -18)$ (ii) $y = 2x^2 - 4x - 16$
- 9 (ii) $x = 40 - 20\sqrt{3}$; 90.2 cm^2