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 $\dfrac{a^3+1}{a+1} \times \dfrac{a^3-1}{a^2+2a+1} \div \dfrac{a^2-a}{a+1}$ into a single fraction.

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

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

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

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.

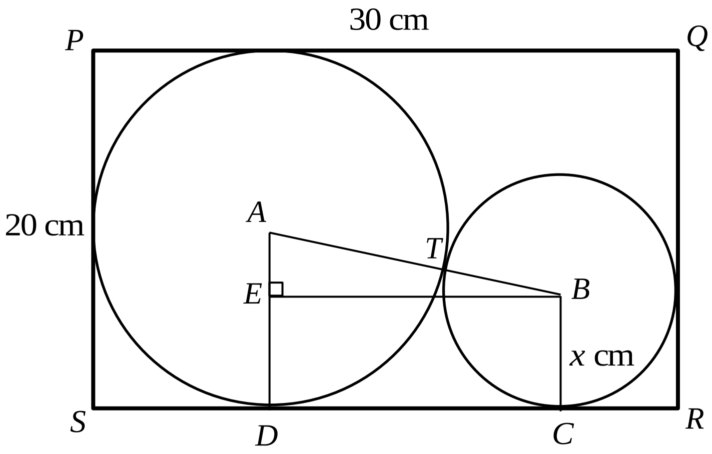
7 Show that, regardless of the value of k, the equation $2kx + 2k + 3 = x^2$ will always have two real and distinct solutions.

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) $\dfrac{a^4+a^2+1}{a^2+a}$ (b) $-\dfrac{6}{m}$

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) $x = 40-20\sqrt{3}$; $90.2\ \text{cm}^2$