

1 (a) Simplify

$$\sqrt{50} - \sqrt{18}$$

giving your answer in the form  $a\sqrt{2}$ , where  $a$  is an integer.

(b) Hence, or otherwise, simplify

$$\frac{12\sqrt{3}}{\sqrt{50} - \sqrt{18}}$$

giving your answer in the form  $b\sqrt{c}$ , where  $b$  and  $c$  are integers and  $b \neq 1$

2. (a) Write down the value of  $32^{\frac{1}{5}}$

(b) Simplify fully  $(32x^5)^{-\frac{2}{5}}$

3. (a) Write  $\sqrt{80}$  in the form  $c\sqrt{5}$ , where  $c$  is a positive constant

(b) A rectangle R has a length of  $(1 + \sqrt{5})$  cm and an area of  $\sqrt{80}$  cm<sup>2</sup>.

Calculate the width of R in cm. Express your answer in the form  $p + q\sqrt{5}$ , where  $p$  and  $q$  are integers to be found.

4. Simplify  $(3\sqrt{5})^2$

(b) Express  $\frac{(3\sqrt{5})^2 + \sqrt{5}}{7 + 3\sqrt{5}}$  in the form  $m + n\sqrt{5}$ , where  $m$  and  $n$  are integers.

5. (a) Express  $9^{3x+1}$  in the form  $3^y$ , giving  $y$  in the form  $ax + b$ , where  $a$  and

$b$  are constants.

(b) Given that  $y = 2^x$ ,

i. Express  $4^x$  in terms of  $y$

ii. Hence, or otherwise, solve  $8(4^x) - 9(2^x) + 1 = 0$

6. The line AB has equation  $5x + 3y + 3 = 0$ .

(a) The line AB is parallel to the line with equation  $y = mx + 7$ .

Find the value of  $m$ .

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The point with coordinates  $(2k+3, 4-3k)$  lies on the line AB.  
Find the value of  $k$ .

[4]

7. The line AB has equation  $3x + 5y = 7$ .

(a) Find the gradient of AB

[2]

(b) Find an equation of the line that is perpendicular to the line AB and which passes through the point  $(-2, -3)$ . Express your answer in the form  $px + qy + r = 0$ , where  $p$ ,  $q$  and  $r$  are integers

[5]

(c) The line AC has equation  $2x - 3y = 30$ . Find the coordinates of A

8. The point P has coordinates  $(\sqrt{3}, 2\sqrt{3})$  and the point Q has coordinates  $(\sqrt{5}, 4\sqrt{5})$ . Show that the gradient of PQ can be expressed as  $n + \sqrt{15}$ , stating the value of the integer  $n$ .

[6]

9. Given that  $y=2^x$ , show that  $2^{2x+1} - 17(2^x) + 8 = 0$

can be written in the form

$$2y^2 - 17y + 8 = 0$$

Hence solve

$$2y^2 - 17y + 8 = 0$$

10. Solve the following

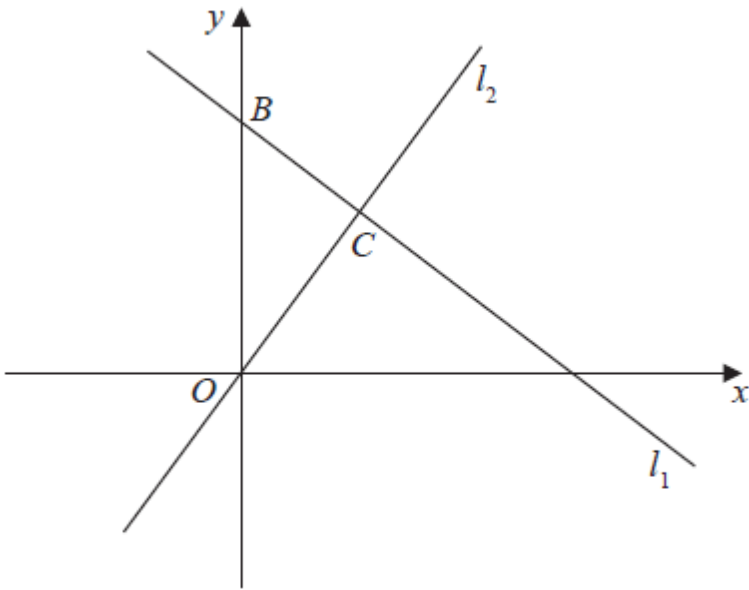
$$y - x = 4$$

$$2x^2 + xy = -1$$

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**Figure 2**

The line  $l_1$ , shown in Figure 1 has equation  $2x + 3y = 26$

The line  $l_2$  passes through the origin  $O$  and is perpendicular to  $l_1$

(a) Find an equation for the line  $l_2$

[4]

The line  $l_2$  intersects the line  $l_1$  at the point  $C$ .

Line  $l_1$  crosses the  $y$ -axis at the point  $B$  as shown in Figure 1.

(b) Find the coordinates of  $B$  and  $C$

[5]