

# COORDINATE GEOMETRY

# Answers

- 1**    **a**  $= \frac{5-1}{5-3} = 2$             **b**  $= \frac{9-7}{10-4} = \frac{1}{3}$             **c**  $= \frac{5-1}{2-6} = -1$             **d**  $= \frac{8-2}{2+2} = \frac{3}{2}$   
**e**  $= \frac{-1-3}{7-1} = -\frac{2}{3}$             **f**  $= \frac{-7-5}{-5-4} = \frac{4}{3}$             **g**  $= \frac{-8-0}{0+2} = -4$             **h**  $= \frac{-2-6}{-7-8} = \frac{8}{15}$
- 2**    **a** grad = 4                    **b** grad =  $\frac{1}{3}$                     **c** grad = -1                    **d** grad = -2  
       **e** y-int = -1                    **f** y-int = 3                    **g** y-int = 6                    **h** y-int =  $-\frac{3}{5}$
- 3**    **a**  $y = -x - 3$                     **b**  $2y = x - 6$                     **c**  $3y = -3x + 2$                     **d**  $5y = 4x + 1$   
       grad = -1                     $y = \frac{1}{2}x - 3$                      $y = -x + \frac{2}{3}$                      $y = \frac{4}{5}x + \frac{1}{5}$   
       y-int = -3                    grad =  $\frac{1}{2}$                     grad = -1                    grad =  $\frac{4}{5}$   
   y-int = -3                    y-int =  $\frac{2}{3}$                     y-int =  $\frac{1}{5}$
- 4**    **a**  $y - 1 = 2(x - 4)$                     **b**  $y + 5 = 5(x - 2)$   
**c**  $y - 1 = -3(x + 1)$                     **d**  $y - 6 = \frac{1}{2}(x - 1)$   
**e**  $y + \frac{1}{4} = -2(x - \frac{3}{4})$                     **f**  $y + 7 = -\frac{1}{5}(x + 3)$
- 5**    **a**  $y - 2 = 3(x - 1)$                     **b**  $y - 3 = -(x - 5)$   
        $y = 3x - 1$                      $y = -x + 8$   
**c**  $y + 3 = 4(x + 2)$                     **d**  $y - 1 = -2(x + 4)$   
        $y = 4x + 5$                      $y = -2x - 7$   
**e**  $y - 1 = \frac{1}{3}(x + 3)$                     **f**  $y + 2 = -\frac{5}{6}(x - 9)$   
        $y = \frac{1}{3}x + 2$                      $y = -\frac{5}{6}x + \frac{11}{2}$
- 6**    **a**  $y + 4 = x - 2$                     **b**  $y - 1 = \frac{1}{2}(x - 6)$                     **c**  $y - 8 = -4(x + 1)$   
        $x - y - 6 = 0$                      $2y - 2 = x - 6$                      $y - 8 = -4x - 4$   
    $x - 2y - 4 = 0$                      $4x + y - 4 = 0$   
**d**  $y - 5 = \frac{2}{5}(x + 3)$                     **e**  $y + \frac{1}{8} = -3(x - \frac{3}{2})$                     **f**  $y + 7 = -\frac{3}{4}(x - \frac{2}{3})$   
        $5y - 25 = 2x + 6$                      $8y + 1 = -24x + 36$                      $4y + 28 = -3x + 2$   
        $2x - 5y + 31 = 0$                      $24x + 8y - 35 = 0$                      $3x + 4y + 26 = 0$
- 7**    **a** grad =  $\frac{13-1}{4-0} = 3$                     **b** grad =  $\frac{-1-9}{7-2} = -2$                     **c** grad =  $\frac{7-3}{2+4} = \frac{2}{3}$   
        $y = 3x + 1$                      $y - 9 = -2(x - 2)$                      $y - 3 = \frac{2}{3}(x + 4)$   
    $y = -2x + 13$                      $y = \frac{2}{3}x + \frac{17}{3}$   
**d** grad =  $\frac{8+2}{2+\frac{1}{2}} = 4$                     **e** grad =  $\frac{-5+2}{18-3} = -\frac{1}{5}$                     **f** grad =  $\frac{0.4-4}{-2+3.2} = -3$   
        $y - 8 = 4(x - 2)$                      $y + 2 = -\frac{1}{5}(x - 3)$                      $y - 4 = -3(x + 3.2)$   
        $y = 4x$                      $y = -\frac{1}{5}x - \frac{7}{5}$                      $y = -3x - 5.6$

- 8**    **a**  $\text{grad} = \frac{2-0}{5-3} = 1$                       **b**  $\text{grad} = \frac{-4-8}{5+1} = -2$                       **c**  $\text{grad} = \frac{5-3}{7+5} = \frac{1}{6}$   
 $y = x - 3$                                        $y - 8 = -2(x + 1)$                        $y - 3 = \frac{1}{6}(x + 5)$   
 $x - y - 3 = 0$                                        $y - 8 = -2x - 2$                        $6y - 18 = x + 5$   
 $2x + y - 6 = 0$                                        $x - 6y + 23 = 0$
- d**  $\text{grad} = \frac{-17+1}{8+4} = -\frac{4}{3}$                       **e**  $\text{grad} = \frac{0+1.5}{7-2} = 0.3$                       **f**  $\text{grad} = \frac{1-\frac{1}{10}}{3+\frac{3}{5}} = \frac{1}{4}$   
 $y + 1 = -\frac{4}{3}(x + 4)$                        $y = 0.3(x - 7)$                        $y - 1 = \frac{1}{4}(x - 3)$   
 $3y + 3 = -4x - 16$                        $10y = 3x - 21$                        $4y - 4 = x - 3$   
 $4x + 3y + 19 = 0$                        $3x - 10y - 21 = 0$                        $x - 4y + 1 = 0$
- 9**    **a**  $\text{grad} = \frac{2-8}{3+6} = -\frac{2}{3}$                       **10**  $k - 3(2k) + 15 = 0$   
 $\therefore y - 8 = -\frac{2}{3}(x + 6)$                        $15 = 5k$   
 $[2x + 3y - 12 = 0]$                        $k = 3$
- b** sub.  
 $2(9) + 3(-2) - 12 = 18 - 6 - 12 = 0$   
 $\therefore C$  lies on  $l$
- 11**  $2(4p) - 4(p^2) + 5 = 0$   
 $4p^2 - 8p - 5 = 0$   
 $(2p + 1)(2p - 5) = 0$   
 $p = -\frac{1}{2}$  or  $\frac{5}{2}$
- 12**    **a**  $x = 0: y = 5$                       **b**  $x = 0: y = 2$                       **c**  $x = 0: y = \frac{3}{4}$                       **d**  $x = 0: y = -\frac{10}{3}$   
 $y = 0: x = -\frac{5}{2}$                        $y = 0: x = -6$                        $y = 0: x = \frac{3}{2}$                        $y = 0: x = 2$   
 $(-\frac{5}{2}, 0)$  and  $(0, 5)$                        $(-6, 0)$  and  $(0, 2)$                        $(0, \frac{3}{4})$  and  $(\frac{3}{2}, 0)$                        $(0, -\frac{10}{3})$  and  $(2, 0)$
- 13**    **a**  $x = 0 \Rightarrow y = -\frac{5}{3}$   
 $y = 0 \Rightarrow x = 6$      $\therefore (0, -\frac{5}{3})$  and  $(6, 0)$
- b**  $\text{area} = \frac{1}{2} \times 6 \times \frac{5}{3} = 5$
- 14**    **a**  $= \sqrt{3^2 + 4^2}$                       **b**  $= \sqrt{3^2 + 1^2}$                       **c**  $= \sqrt{8^2 + 15^2}$   
 $= \sqrt{25} = 5$                                        $= \sqrt{10}$                                        $= \sqrt{289} = 17$
- d**  $= \sqrt{16^2 + 12^2}$                       **e**  $= \sqrt{2^2 + 5^2}$                       **f**  $= \sqrt{8^2 + 4^2}$   
 $= \sqrt{400} = 20$                                        $= \sqrt{29}$                                        $= \sqrt{80} = 4\sqrt{5}$
- 15** let centre be  $C$   $\therefore$  radius  $= CP = \sqrt{20^2 + 15^2} = \sqrt{625} = 25$   
 $\therefore CQ^2 = 15^2 + c^2 = 25^2$   
 $c^2 = 625 - 225 = 400$   
 $c = \pm 20$   
 $CR^2 = (k - 2)^2 + 24^2 = 25^2$   
 $(k - 2)^2 = 625 - 576 = 49$   
 $k - 2 = \pm 7$   
 $k = -5$  or  $9$

- 16**  $AB^2 = 8^2 + 10^2 = 164$   
 $AB = \sqrt{164} = 2\sqrt{41}$   
radius =  $\frac{1}{2}AB = \sqrt{41}$   
area =  $\pi \times (\sqrt{41})^2 = 41\pi$
- 17** **a**  $PQ = \sqrt{6^2 + 2^2} = \sqrt{40} = 2\sqrt{10}$   
 $PR = \sqrt{1^2 + 17^2} = \sqrt{290}$   
 $QR = \sqrt{5^2 + 15^2} = \sqrt{250} = 5\sqrt{10}$   
**b**  $PQ^2 + QR^2 = 40 + 250 = 290 = PR^2$   
 $\therefore$  by converse of Pythagoras'  
 $\angle PQR$  is a right-angle  
**c** area =  $\frac{1}{2} \times PQ \times QR = 50$
- 18** **a**  $(\frac{0+8}{2}, \frac{2+4}{2}) = (4, 3)$       **b**  $(\frac{1+7}{2}, \frac{9+5}{2}) = (4, 7)$       **c**  $(\frac{-5+3}{2}, \frac{1-7}{2}) = (-1, -3)$   
**d**  $(\frac{-5+7}{2}, \frac{-7-5}{2}) = (1, -6)$       **e**  $(\frac{1+2}{2}, \frac{0+9}{2}) = (\frac{3}{2}, \frac{9}{2})$       **f**  $(\frac{-1+4}{2}, \frac{-2-5}{2}) = (\frac{3}{2}, -\frac{7}{2})$   
**g**  $(\frac{2.4+0.6}{2}, \frac{3.1+4.5}{2}) = (1.5, 3.8)$       **h**  $(\frac{0+\frac{1}{2}}{2}, \frac{3+\frac{3}{2}}{2}) = (\frac{1}{4}, \frac{9}{4})$       **i**  $(\frac{-\frac{5}{4}-1}{2}, \frac{2-\frac{3}{5}}{2}) = (-\frac{9}{8}, \frac{7}{10})$
- 19** **a** grad =  $\frac{-1-1}{4+2} = -\frac{1}{3}$   
 $y - 1 = -\frac{1}{3}(x + 2)$   
 $3y - 3 = -x - 2$   
 $x + 3y - 1 = 0$   
**b** mid-point of  $PQ = (\frac{-2+4}{2}, \frac{1-1}{2}) = (1, 0)$   
grad of  $l_2 = \frac{0-4}{1-2} = 4$   
 $y = 4(x - 1)$   
 $y = 4x - 4$
- 20** **a**  $2x + 1 = 3x - 1$   
 $x = 2$   
 $\therefore (2, 5)$   
**b**  $x + 7 = 4 - 2x$   
 $3x = -3$   
 $x = -1$   
 $\therefore (-1, 6)$   
**c**  $5x - 4 = 3x - 1$   
 $2x = 3$   
 $x = \frac{3}{2}$   
 $\therefore (\frac{3}{2}, \frac{7}{2})$   
**d** adding  
 $4x = 0$   
 $x = 0$   
 $\therefore (0, 2)$   
**e**  $6x + 3y - 6 = 0$   
 $x + 3y + 9 = 0$   
subtracting  
 $5x - 15 = 0$   
 $x = 3$   
 $\therefore (3, -4)$   
**f**  $6x + 4y = 0$   
 $x + 4y - 2 = 0$   
subtracting  
 $5x + 2 = 0$   
 $x = -\frac{2}{5}$   
 $\therefore (-\frac{2}{5}, \frac{3}{5})$
- 21**  $l: x = 0 \Rightarrow y = 1 \therefore P(0, 1)$   
 $m: x = 0 \Rightarrow y = 15 \therefore Q(0, 15)$   
 $l \quad x - 2y + 2 = 0$   
 $m \Rightarrow 6x + 2y - 30 = 0$   
adding,  $7x - 28 = 0$   
 $x = 4$   
sub.  $y = 3 \therefore R(4, 3)$   
area =  $\frac{1}{2} \times 14 \times 4 = 28$

