



Lesmahagow High School
Mathematics Department

National 5

Gradients

Corrective Actions

WORKSHEETS

<https://www.national5maths.co.uk/free-national-5-maths-2/>

Gradient	
Find the gradient of a line joining two points	<p>Know that gradient is represented by the letter <i>m</i></p> <p>Step 1: Select two coordinates</p> <p>Step 2: Label them (x_1, y_1) (x_2, y_2)</p> <p>Step 3: Substitute them into gradient formula</p> <p>e.g. $(-4, 4), (12, -28)$</p> $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{(-28) - 4}{12 - (-4)} = -\frac{32}{16} = -2$



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Gradient

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DETERMINING the GRADIENT of a STRAIGHT LINE given TWO POINTS

4. Calculate the gradient of the line joining each pair of points below:
- (a) (2, 1) and (6, 3) (b) (1, 5) and (3, 1) (c) (2, 0) and (4, 6)
(d) (4, 3) and (8, 11) (e) (1, 9) and (3, 1) (f) (7, 3) and (5, 2)
(g) (-2, -3) and (2, 3) (h) (-1, 2) and (5, -1) (i) (-4, 2) and (4, -4)
(j) (-6, -2) and (-5, 3) (k) (4, -3) and (6, 5) (l) (-2, 3) and (0, -2)

5. Calculate the gradient of the line joining each pair of points below:
- (a) A(-2, 6) and B(8, 8) (b) C(3, -3) and D(4, -1)
(c) E(5, -9) and F(8, -15) (d) G(0, 6) and H(5, 11)
(e) I(-1, -3) and J(7, -9) (f) K(-4, 0) and L(-1, 5)
(g) M(2, 2) and N(-3, 4) (h) P(5, -1) and Q(-2, 10)
(i) R(-3, -5) and S(8, -4) (j) T(4, -6) and U(7, -2)
(k) V(5, -6) and W(-2, 6) (l) X(-1, 7) and Y(-2, 6)
(m) J(6, 8) and K(-3, -5) (n) S(3, -5) and T(-2, 8)
(o) D(6, -3) and E(0, 4) (p) F(6, 9) and G(-5, -5)

6. Prove that the following sets of points are collinear:
- (a) A(-6, -1), B(2, 3) and C(4, 4)
(b) P(1, -1), Q(-3, 5) and R(7, -10)
(c) E(5, -3), F(11, -2) and G(-7, -5)
(d) K(5, -4), L(-1, 4) and M(9½, -10)

7. Given that each set of points are collinear, find the value of k in each case:
- (a) $P(-4, -2)$, $Q(-1, -1)$ and $R(8, k)$
 - (b) $A(1, 3)$, $B(3, k)$ and $C(4, -6)$
 - (c) $E(-4, -1)$, $F(k, -1)$ and $G(8, 7)$
 - (d) $S(k, 2)$, $T(9, 1)$ and $U(-3, 4)$
8. The points E and F have coordinates $(2, -5)$ and $(-4, a)$ respectively. Given that the gradient of the line EF is $\frac{2}{3}$, find the value of a .
9. If the points $(3, 2)$, $(-1, 0)$ and $(4, k)$ are collinear, find k .
10. Given that the points $(3, -2)$, $(4, 5)$ and $(-1, a)$ are collinear, find the value of a .
11. The line which passes through $(1, 4)$ and $(2, 5)$ is parallel to the line through $(3, 7)$ and $(k, 5)$. Find the value of k .
12. The line which passes through $(-2, 3)$ and $(-5, -9)$ is parallel to the line through $(4, k)$ and $(-1, -1)$. Find the value of k .



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Solutions

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DETERMINING the GRADIENT of a STRAIGHT LINE given TWO POINTS

1. (a) (i) 2 (ii) $-\frac{1}{2}$ (iii) $\frac{4}{3}$ (iv) $-\frac{1}{6}$ (v) 1
(b) 0; undefined; positive; negative
2. (a) 1 (b) 2 (c) $\frac{2}{3}$ (d) 5 (e) $\frac{1}{3}$ (f) $\frac{3}{2}$
(g) -3 (h) $-\frac{1}{2}$ (i) $-\frac{3}{2}$ (j) -1 (k) -6 (l) $-\frac{1}{8}$
3. (a) -3 (b) $\frac{1}{2}$ (c) 1 (d) $-\frac{1}{2}$ (e) $\frac{2}{5}$ (f) 4
4. (a) $\frac{1}{2}$ (b) -2 (c) 3 (d) 2 (e) -4 (f) $\frac{1}{2}$
(g) $\frac{3}{2}$ (h) $-\frac{1}{2}$ (i) $-\frac{3}{4}$ (j) 5 (k) 4 (l) $-\frac{5}{2}$
5. (a) $\frac{1}{5}$ (b) 2 (c) -2 (d) 1 (e) $-\frac{3}{4}$ (f) $\frac{5}{3}$
(g) $-\frac{2}{5}$ (h) $-\frac{11}{7}$ (i) $\frac{1}{11}$ (j) $\frac{4}{3}$ (k) $-\frac{12}{7}$ (l) 1
(m) $\frac{13}{9}$ (n) $-\frac{13}{5}$ (o) $-\frac{7}{6}$ (p) $\frac{14}{11}$
6. (a) both gradients $\frac{1}{2}$ (b) both gradients $-\frac{3}{2}$
(c) both gradients $\frac{1}{6}$ (d) both gradients $-\frac{4}{3}$
7. (a) $k = 2$ (b) $k = -3$ (c) $k = -4$ (d) $k = 5$
8. $a = -9$ 9. $k = 2.5$ 10. $a = -30$ 11. $k = 1$ 12. $k = 19$