education equals

**Topic: Linear Graph Skills**

Time: 45 mins Marks: /45 marks

**No calculator allowed**

**Question One: [12 marks]**

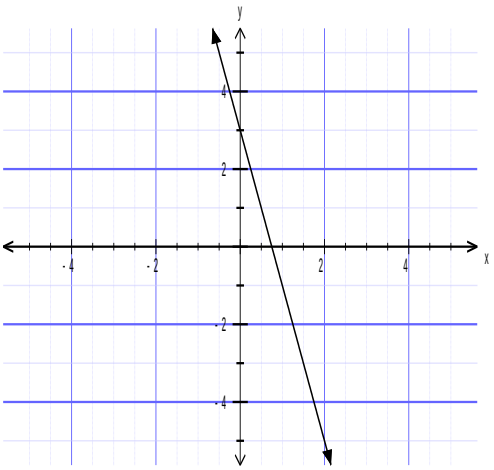
Each of the following (A to G) represents a linear equation. Order A to G in order of the gradients from least steep to steepest.

A: $\frac{y}{3} - 2x = 10$

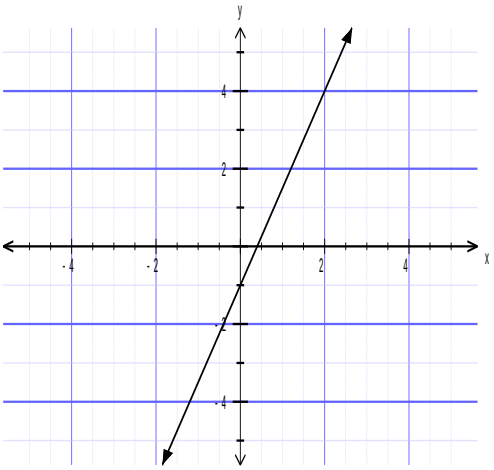
B: $\frac{x-5}{4} = 2y + 6$

C: $3y + 2x - 12 = 2$

D:




E:



F:

| $x$ | 2 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| $y$ | 6 | 12 | 18 | 24 | 30 | 36 |

G:

| $x$ | 1 | 4 | 6 | 5 | 2 | 3 |
|---|---|---|---|---|---|---|
| $y$ | 10 | 7 | 5 | 6 | 9 | 8 |

**Question Two: [6, 4, 5: 15 marks]**

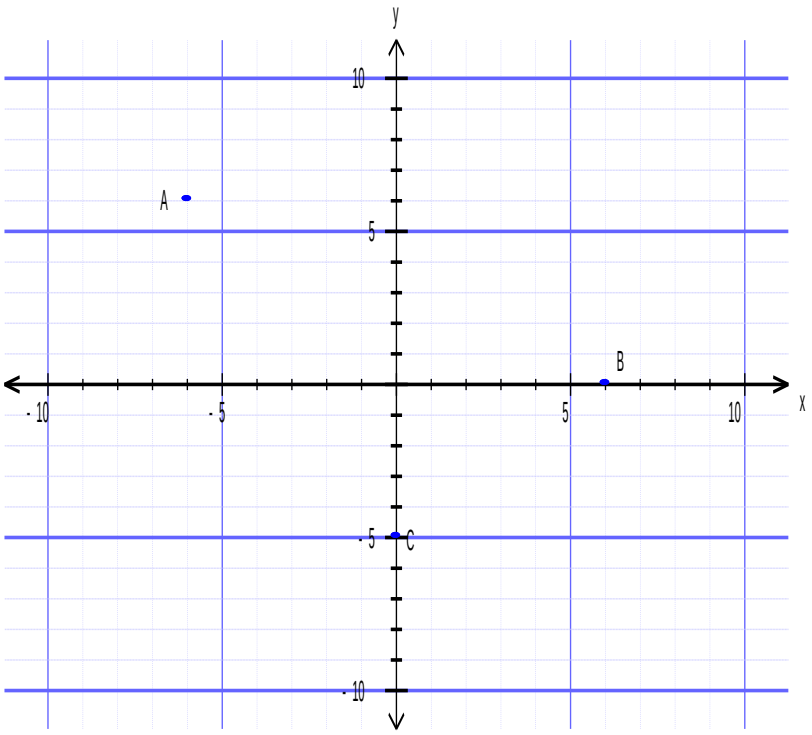
a) Find the equation **and** the length of a line segment which has a mid-point of (2, 5) and one end of the line segment being point (-1, 6).

b) If the gradient between point A and point B is $\frac{3}{4}$, give two possible answers for the distance between A and B.

c) Calculate the equation of the line which is the perpendicular bisector of the points (-3, 9) and (7, 4).

**Question Three: [2, 2, 2, 4, 5, 3 : 18 marks ]**

Consider the points A, B and C on the graph below.




a) Find the midpoint of AC

b) Find the gradient of the line AB.

c) Find the equation of the line from the midpoint of AC and parallel to AB.

b) Is triangle ABC a right triangle? Justify your answer mathematically.

c) Without calculating, explain how to calculate the area of triangle ABC.

d) Does the line $y = -\frac{1}{7}x + 9$ cross through triangle ABC? Justify your answer.

education equals

**Topic: Linear Graph Skills SOLUTIONS**

Time: 45 mins Marks: /45 marks

**No calculator allowed**

**Question One: [12 marks]**

Each of the following (A to G) represents a linear equation. Order A to G in order of the gradients from least steep to steepest.

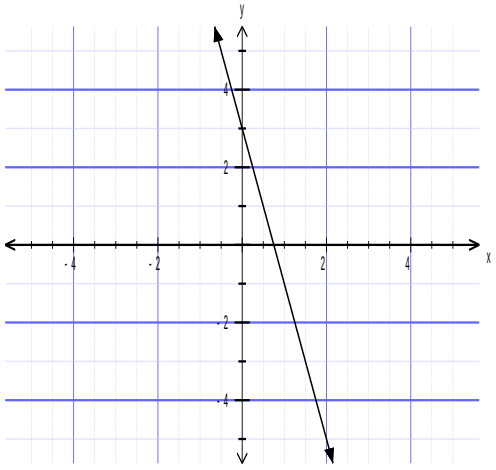
A: $\frac{y}{3} - 2x = 10$ $\frac{y}{3} = 10 + 2x$

$y = 30 + 6x$ $m = 6$ ✓ ✓

B: $\frac{x-5}{4} = 2y + 6$ $\frac{x}{4} - \frac{5}{4} - 6 = 2y$ $m = \frac{1}{8}$ ✓ ✓

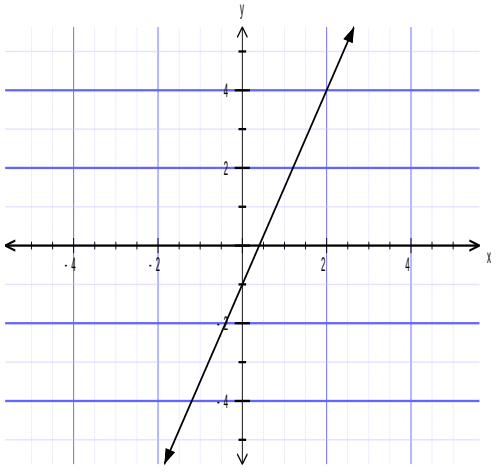
C: $3y + 2x - 12 = 2$ $m = \frac{-2}{3}$ ✓ ✓

D:




$m = -\frac{1}{4}$ ✓

E:




$m = \frac{5}{2}$ ✓

F:

| $x$ | 2 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|
| $y$ | 6 | 12 | 18 | 24 | 30 | 36 |

$m = 3$ ✓✓

G:

| $x$ | 1 | 4 | 6 | 5 | 2 | 3 |
|---|---|---|---|---|---|---|
| $y$ | 10 | 7 | 5 | 6 | 9 | 8 |

$m = -1$ ✓

Order: B, D, C, G, E, F, A ✓

**Question Two: [6, 4, 5: 15 marks]**

a) Find the equation **and** the length of a line segment which has a mid-point of (2, 5) and one end of the line segment being point (-1, 6).

**Other point:** $\frac{-1+x}{2} = 2$

$x = 5$

$\frac{6+y}{2} = 5$

$y = 4$

$(5, 4)$ ✓ ✓

**Length** $= \sqrt{(-6)^2 + 2^2}$ ✓

$= \sqrt{40}\ units$ ✓

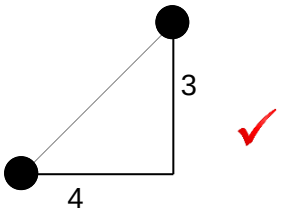
$m = \frac{6-4}{-1-5} = \frac{-2}{-6} = \frac{1}{3}$ ✓

$y = \frac{1}{3}x + c$

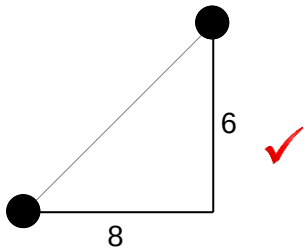
$6 = -\frac{1}{3} + c$

$\therefore y = \frac{1}{3}x + 6\frac{1}{3}$ ✓

b) If the gradient between point A and point B is $\frac{3}{4}$, give two possible answers for the distance between A and B.




✓




✓

5 units ✓ or 10 units ✓

c) Calculate the equation of the line which is the perpendicular bisector of the points (-3, 9) and (7, 4).

$m = \frac{9-4}{-3-7} = \frac{5}{70} = \frac{-1}{2}$ ✓

$perpedicular\ m = 2$ ✓

$y = 2x + c$

$6.5 = 2 \times 2 + c$

$2.5 = c$ ✓

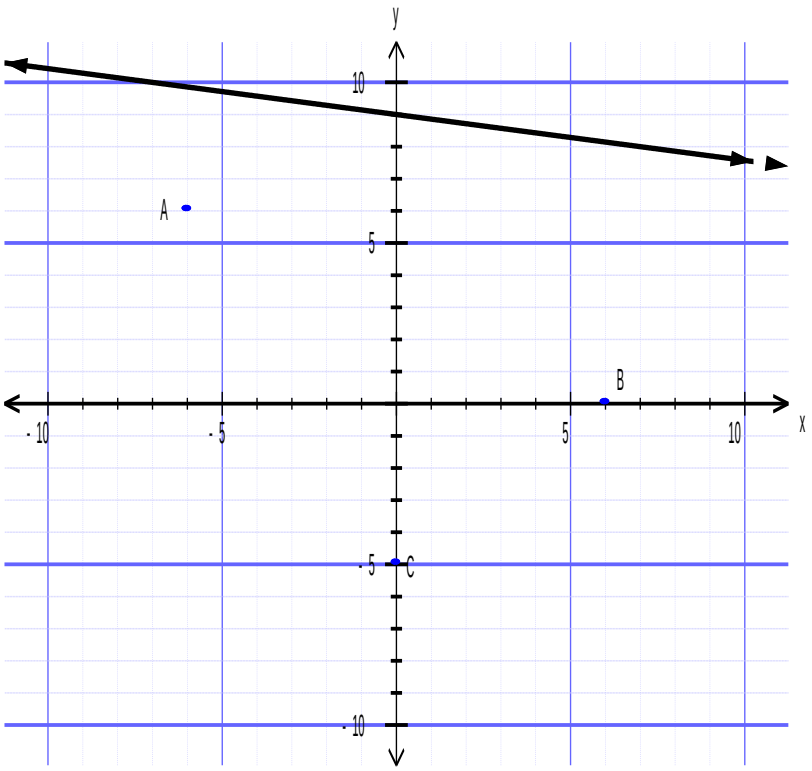
$\therefore y = 2x + 2.5$ ✓

$midpoint: \left(\frac{7-3}{2}, \frac{4+9}{2}\right)$

$= (2, 6.5)$ ✓

**Question Three: [2, 2, 2, 4, 5, 3 : 18 marks ]**

Consider the points A, B and C on the graph below.




a) Find the midpoint of AC

$A(-6,6)\ and\ C(0,-5)$

$midpoint = \left(\frac{-6+0}{2}, \frac{6-5}{2}\right) = (-3, 0.5)$ ✓ ✓

b) Find the gradient of the line AB.

$A(-6,6)\ and\ B(6,0)$

$m = \frac{6-0}{-6-6} = -\frac{1}{2}$ ✓✓

c) Find the equation of the line from the midpoint of AC and parallel to AB.

$m = 2 \qquad point\ (-3, 0.5) \rightarrow 0.5 = 2 \times -3 + c$

$c = 6.5$

$y = 2x + 6.5$

✓ ✓

b) Is triangle ABC a right triangle? Justify your answer mathematically.

$$m_{AB} = -\frac{1}{2}$$

$$m_{AC} = -\frac{11}{6}$$

$$m_{BC} = \frac{5}{6}$$

*The triangle is not right angled since none of these lines intersect at a right angle.*

c) Without calculating, explain how to calculate the area of triangle ABC.

**Find the line perpendicular to AB and including point C.**

**Then calculate the point of intersection between this line and AB, call this point I.**

**Once this point of intersection is found calculate the distance between point I and C.**

**Calculate the length of line AB.**

**AB is the base of the triangle and CI is the height of the triangle.**

**Area** $= \frac{length\ AB \times Length\ CI}{2}$

d) Does the line $y = -\frac{1}{7}x + 9$ cross through triangle ABC? Justify your answer.

*No, see graph*