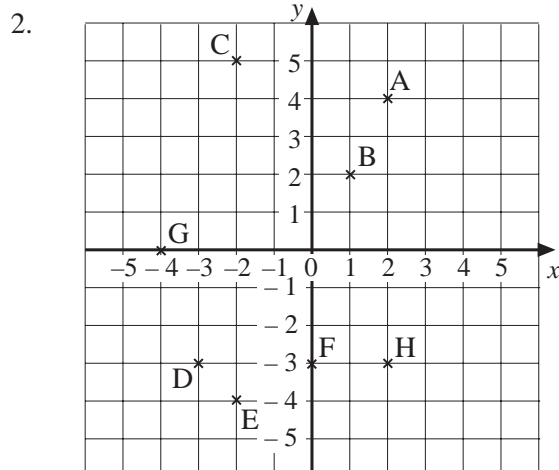


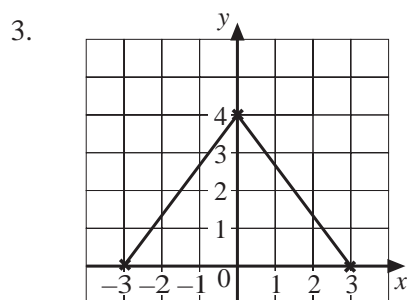
Practice Book *UNIT 5 Linear Graphs and Equations* Answers

5.1 Coordinates

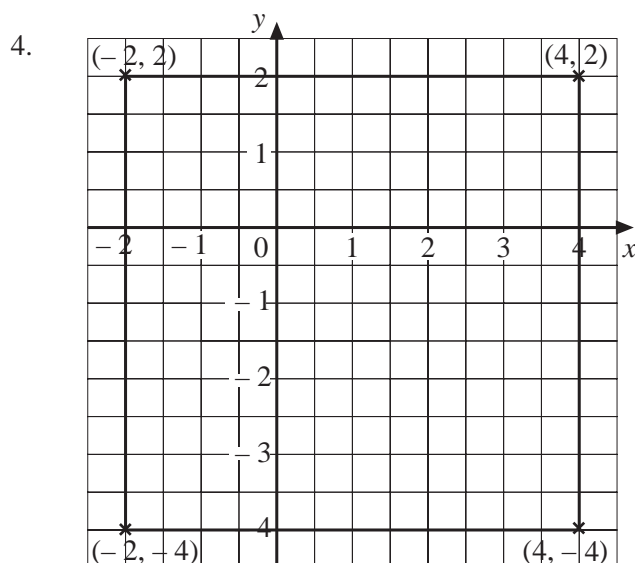
1. A (1, -2) B (-4, 0) C (-2, -3) D (3, 2)
 E (1, 4) F (0, 2) G (-2, 3) H (0, -5)



The points A, B and E all lie on a straight line through the origin.



The shape is an isosceles triangle.

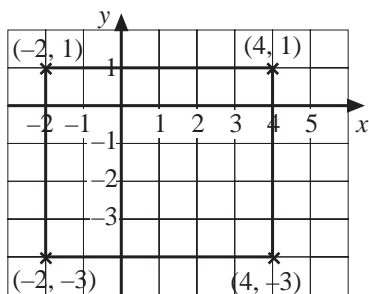


Remaining corner (-2, -4).

5.1

Answers

5.

Remaining corner $(4, -3)$

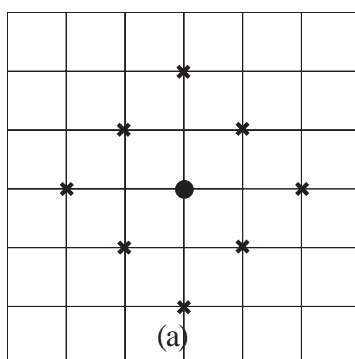
6. (a) 3 units (b) $(-1, -2)$, $(2, -2)$ and $(-1, 4)$, $(2, -4)$
7. (a) $(8, 8)$ (b) $(40, 40)$ because both coordinates are equal to double the tile number
 (c) Daniel is wrong because 25 is an odd number and all the corners with a \bullet have even numbers.

(d)

| <i>Tile Number</i> | <i>Coordinates of the Corner with a ✕</i> |
|--------------------|---|
| 1 | $(2, 1)$ |
| 2 | $(4, 3)$ |
| 3 | $(6, 5)$ |
| 4 | $(8, 7)$ |

- (e) Tile number 7 has a cross in the corner at $(14, 13)$.
- (f) Tile number 10 has a cross in the corner at $(20, 19)$.

8. (a) and (b)



- (c)
- | | | | |
|----------|---|---|---|
| 1st Step | S | W | W |
| 2nd Step | W | S | W |
| 3rd Step | W | W | S |

5.2

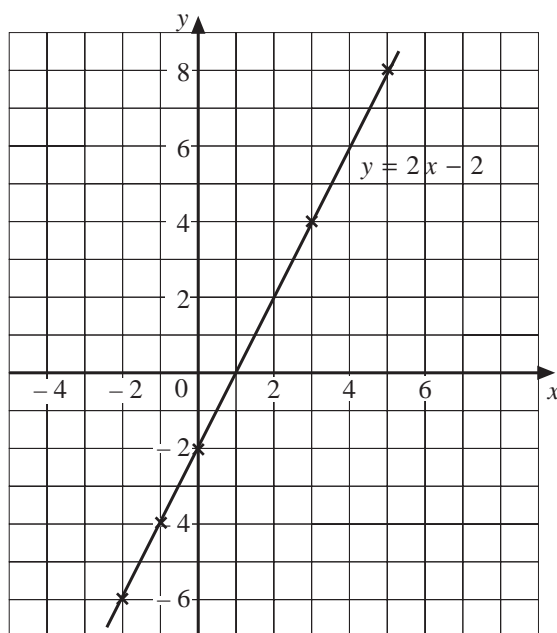
Answers

5.2 Straight Line Graphs

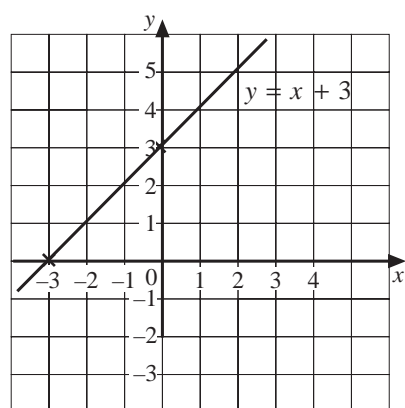
1. (a)

| | | | | | | |
|-----|----|----|----|---|---|---|
| x | -2 | -1 | 0 | 1 | 3 | 5 |
| y | -6 | -4 | -2 | 0 | 4 | 8 |

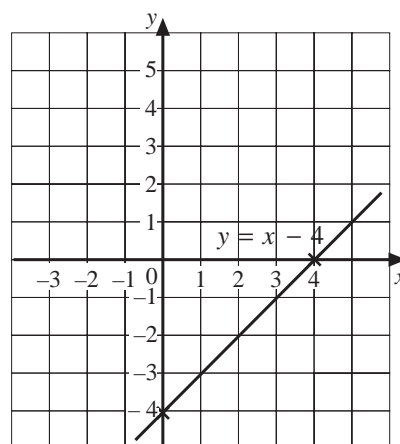
(b)



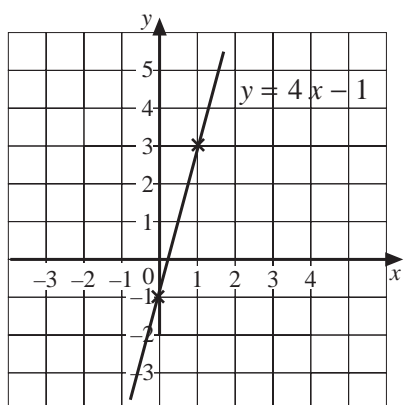
2. (a)



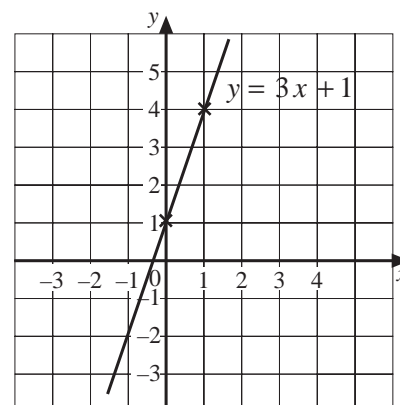
(b)



(c)

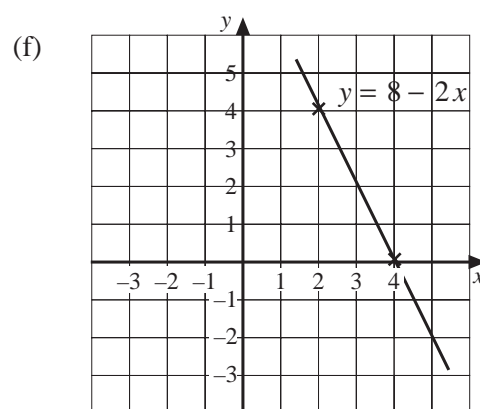
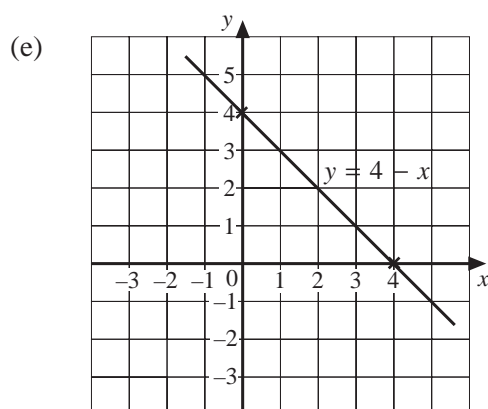


(d)



5.2

Answers

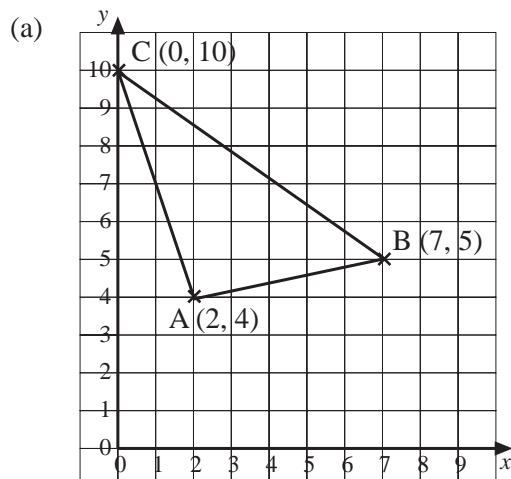


3. (a) 1 (b) 3 (c) 2 (d) 4 (e) -2
 (f) $\frac{1}{2}$ (g) $-\frac{1}{2}$
4. (a) $y = 4x + 2$ (b) $y = 2x - 5$ (c) $y = \frac{1}{2}x + 1$ (d) $y = -x - 5$

5.

| Equation | Gradient | Intercept |
|------------------------|---------------|-----------|
| $y = 5x + 7$ | 5 | 7 |
| $y = 3x - 2$ | 3 | -2 |
| $y = -3x + 2$ | -3 | 2 |
| $y = -4x - 2$ | -4 | -2 |
| $y = 2x + 3$ | -2 | 3 |
| $y = \frac{1}{2}x + 1$ | $\frac{1}{2}$ | 1 |
| $y = 4 - x$ | -1 | 4 |
| $y = 10 - 3x$ | -3 | 10 |

6.

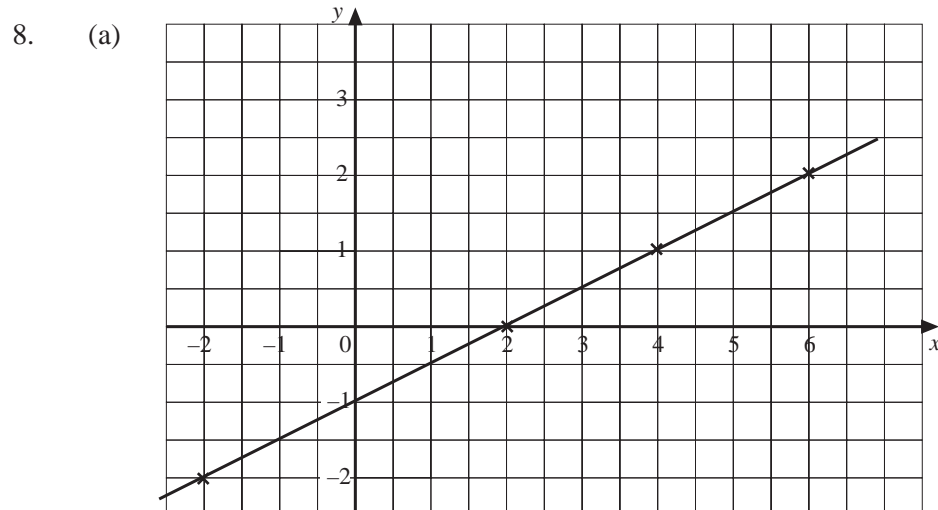


(b) Gradient $AB = \frac{1}{5}$
 $AC = -3$
 $BC = -\frac{5}{7}$

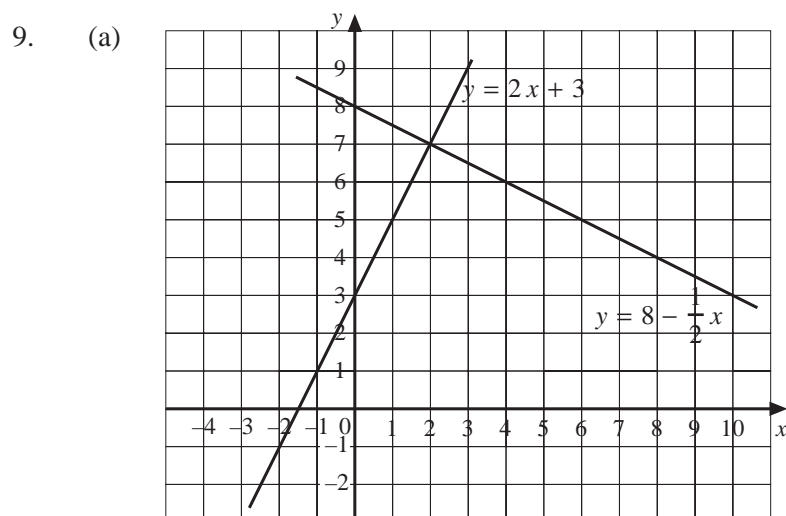
5.2

Answers

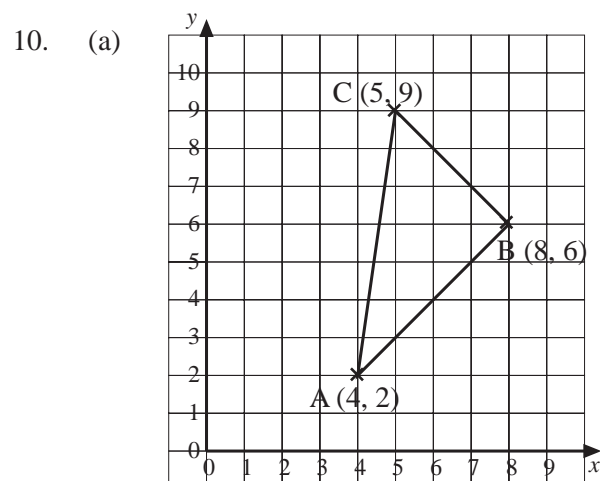
7. (a) $y = 2x$ (b) $y = x - 4$ (c) $y = \frac{1}{2}x + 2$
 (d) $y = 2 - x$ (e) $y = 4x - 3$ (f) $y = -\frac{1}{3}x - 2$



(b) $y = \frac{1}{2}x - 1$



(b) The lines cross at (2, 7).



- (b) A B has equation $y = x - 2$
 B C has equation $y = 14 - x$
 A C has equation $y = 7x - 26$

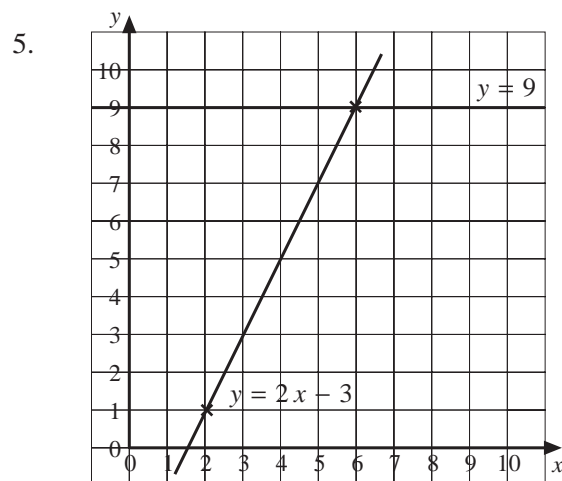
5.2

Answers

11. (a) $x = 8$ (b) $y = x + 7$ (c) $y = x - 1$
12. (a) 5 squares with 4 pins in each square
7 squares with 3 pins in each square
- (b) The gradient 3 tells you how steep the line $p = 3s + 1$ is.
- (c) Any three points on the line $p = 7s + 1$, e.g. (1, 8), (2, 15) and (3, 22)
- (d) $p = 7s + 1$

5.3 Linear Equations

1. (a) $x = 8$ (b) $x = 11$ (c) $x = 3$ (d) $x = 30$
 (e) $x = 8$ (f) $x = 7$ (g) $x = 13$ (h) $x = 7$
 (i) $x = 40$ (j) $x = 500$ (k) $x = 32$ (l) $x = 25$
2. (a) $x = 4$ (b) $x = 7$ (c) $x = 3$ (d) $x = 2$
 (e) $x = 7$ (f) $x = 59$ (g) $x = 8$ (h) $x = 5$
 (i) $x = 11$ (j) $x = 10$ (k) $x = 3$ (l) $x = 2$
3. (a) $x = 2$ (b) $x = 5$ (c) $x = 4$ (d) $x = 3$
 (e) $x = 5$ (f) $x = 4$ (g) $x = 2\frac{1}{2}$ (h) $x = 4\frac{1}{2}$
4. (a) $x = 3$ (b) $x = 6$ (c) $x = 4$

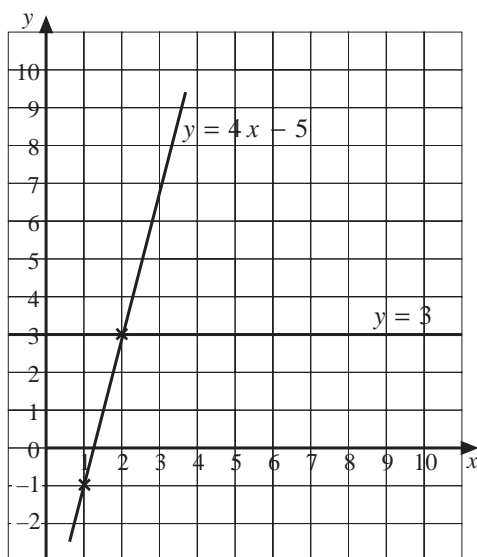


The solution is $x = 6$.

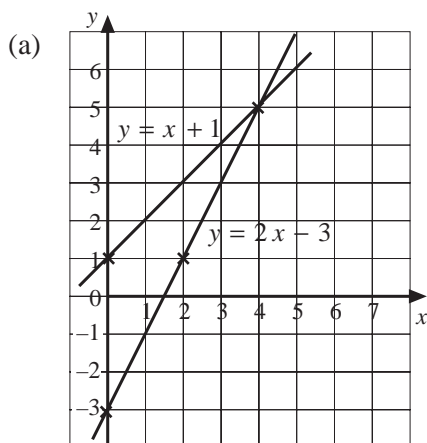
5.3

Answers

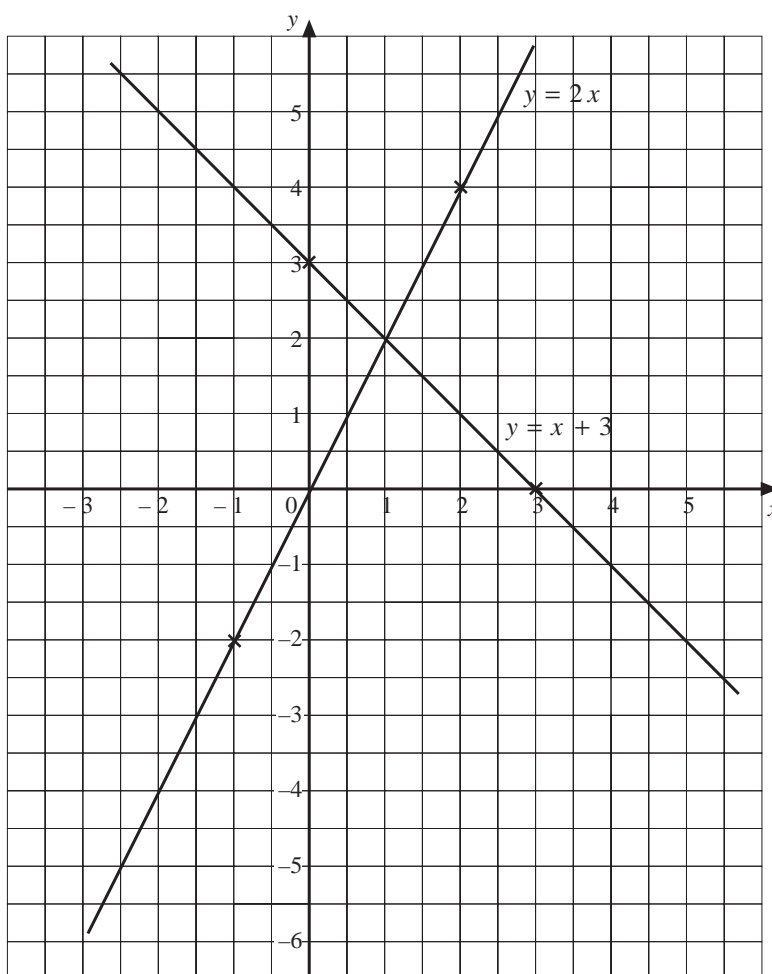
6.

The solution is $x = 2$.

7.

(b) The solution is $x = 4$.

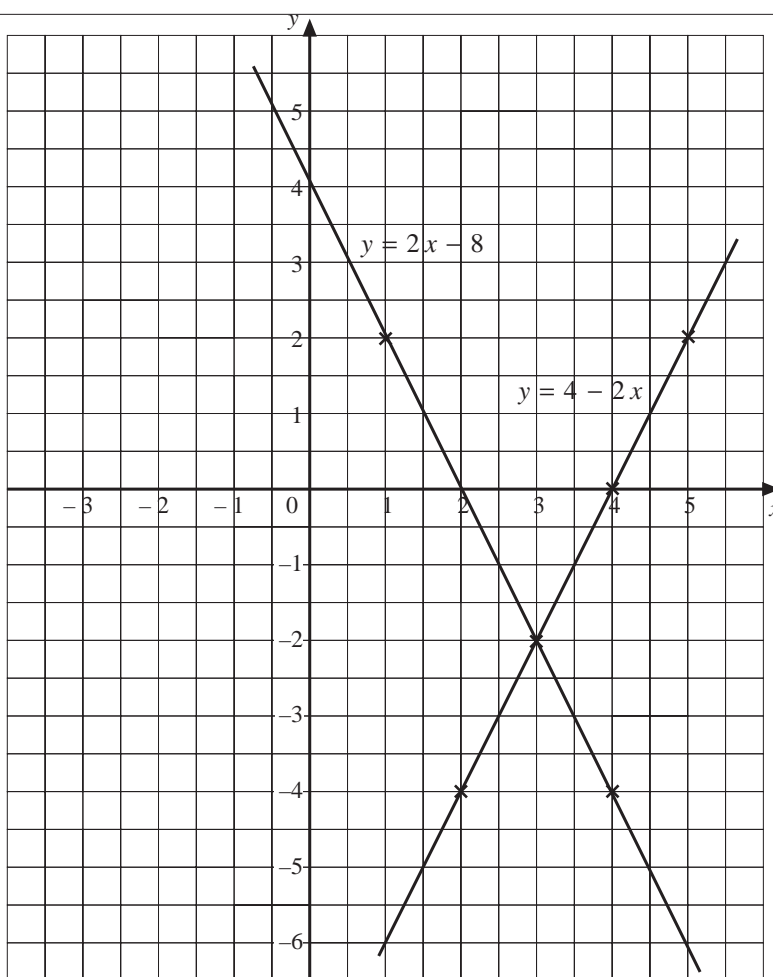
8.

(a) $x = 1$ (see graph opposite)

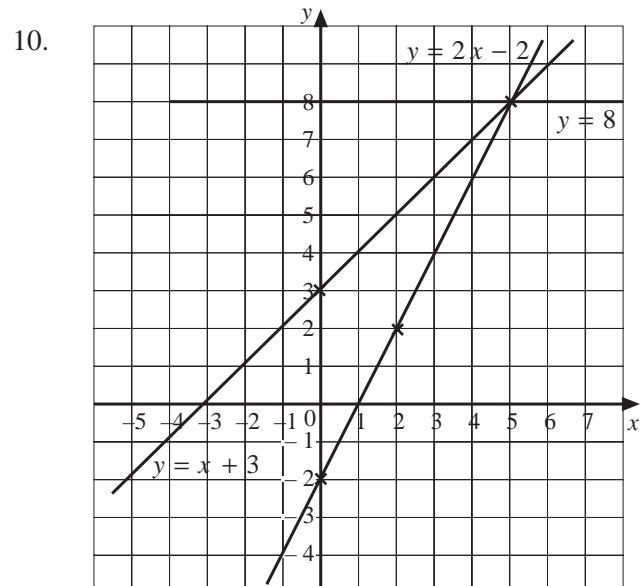
5.3

Answers

8. (b) $x = 3$ (see graph opposite)



9. (a) $x = 3$
 (b) $x = 4$
 (c) $x = 1$



- (a) $x = 5$
 (b) $x = 5$
 (c) $x = 5$

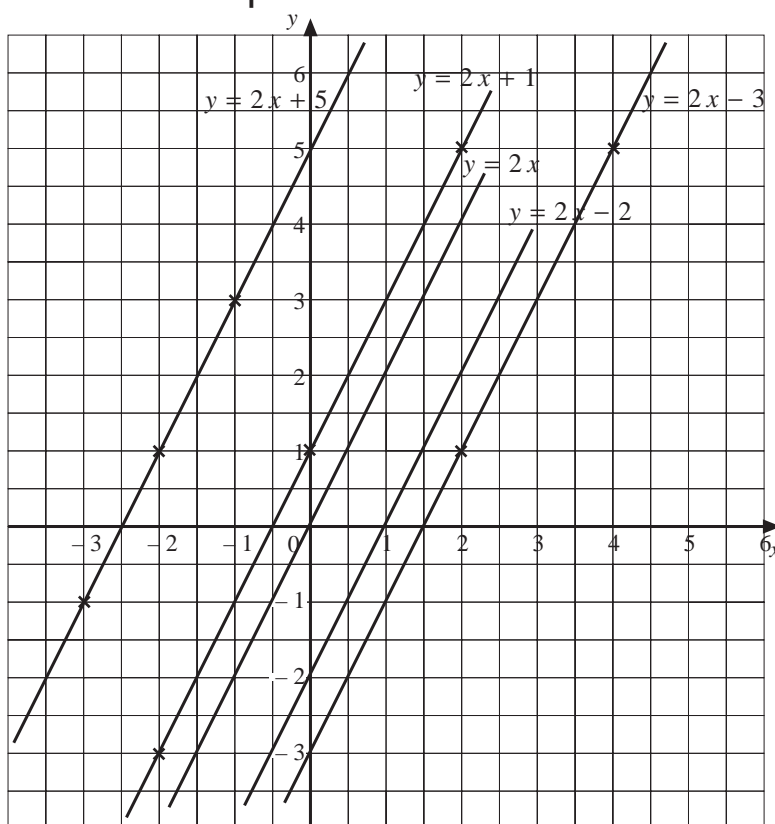
11. (a) $y = 1\frac{1}{2}$ (b) $y = -16$

5.4

Answers

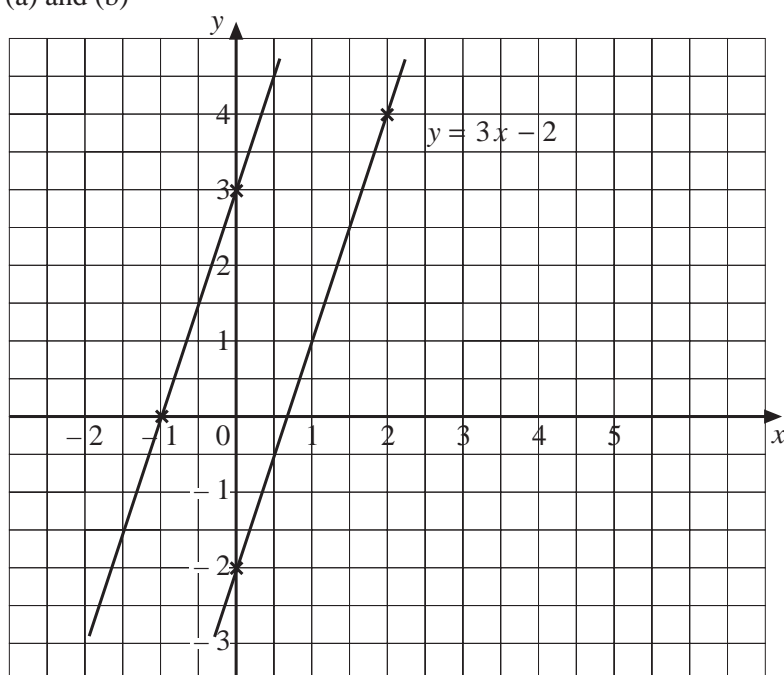
5.4 Parallel and Perpendicular Lines

1. (a)



(b) Any two lines of the form $y = 2x + c$, with c not equal to 5, 1 or -3 . In this case, the diagram shows the lines $y = 2x$ and $y = 2x - 2$.

2. (a) and (b)



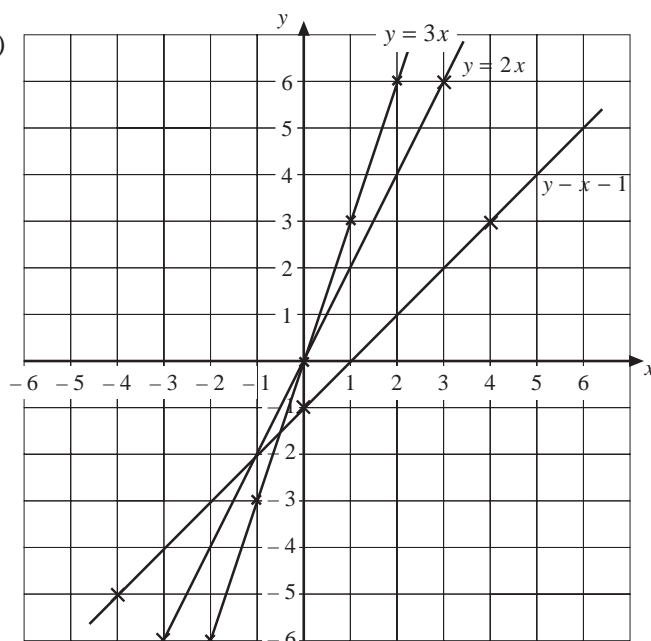
(c) The second line has equation $y = 3x + 3$.

5.4

Answers

3. (a) E (b) D
 (c) There are no lines parallel to B because B has gradient 2 whilst A and E have gradient 5, and C and D have gradient 3.
4. (a) 3 (b) $y = 3x$ (c) $y = 3x - 3$
5. (a) $y = -\frac{1}{4}x + 4$ (b) $y = -\frac{1}{4}x$ (c) $y = -\frac{1}{4}x - 2$
6. (a) $-\frac{2}{3}$ (b) $y = -\frac{2}{3}x + 10$ (c) $y = -\frac{2}{3}x + 6$
7. (a) $\frac{1}{3}$ (b) -3
 (c) The lines are perpendicular because $-3 \times \frac{1}{3} = -1$ and the product of the gradient is -1 for perpendicular lines.
8. (a) D (b) E (c) C
9. (a) Gradient of A = 3
 B = $-\frac{1}{3}$
 C = $-\frac{4}{5}$
 (b) Lines A and B are perpendicular.
10. (a) Any two lines of the form $y = 4x + c$, with $c \neq 3$, e.g. $y = 4x + 10$ and $y = 4x + 8$
 (b) Any two lines of the form $y = -\frac{1}{4}x + c$, e.g. $y = -\frac{1}{4}x + 4$ and $y = -\frac{1}{4}x - 7$

11. (a) and (c)



- (b) Any equation of the form $y = mx$ where $m \neq 2$ or 3 .

- (d) $y = 3x - 1$

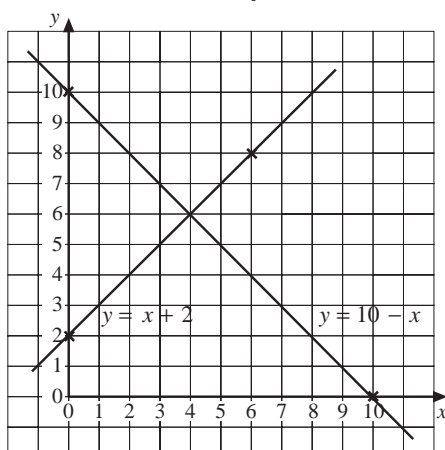
5.4

Answers

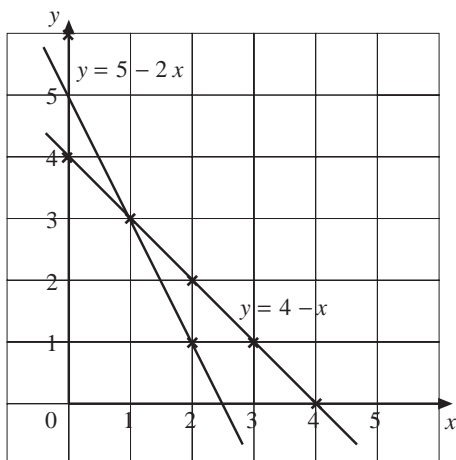
12. (a) That they are parallel, with gradient $= \frac{1}{2}$.
 (b) The constant term gives the intercept, i.e the value where the line crosses the y-axis.
 (c) $(0, -20)$
 (d) Any line of the form $y = \frac{1}{2}x + c$, where $c \neq 4, 0, -3$ or -20 .

5.5 Simultaneous Equations

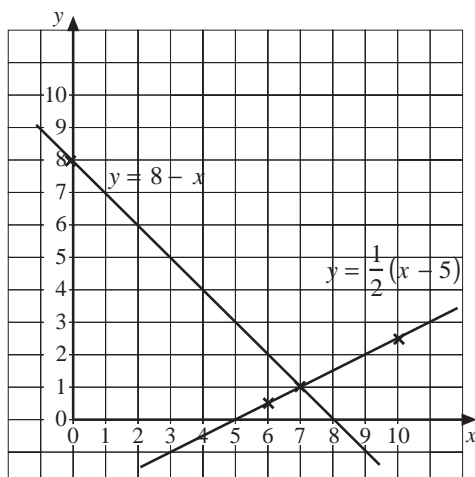
1. (a)

(b) Intersection $(4, 6)$ (c) $x = 4, y = 6$

2. (a)

(b) Intersection $(1, 3)$ (c) $x = 1, y = 3$

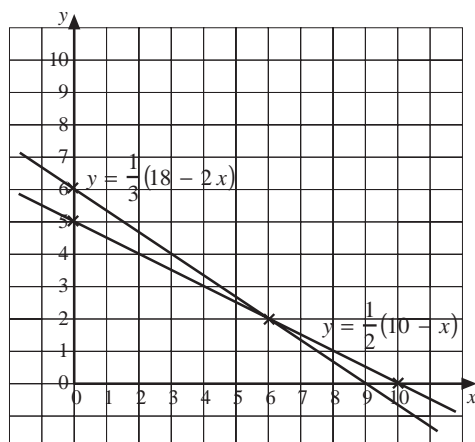
3.

The solution is $x = 7, y = 1$.

5.5

Answers

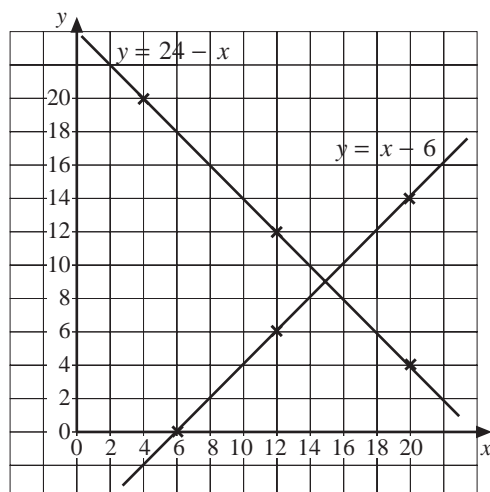
4.



The solution is $x = 6$, $y = 2$.

5. (a) $x + y = 24$
 $x - y = 6$

(b)



The solutions to the simultaneous equations are $x = 15$, $y = 9$, so the numbers are 15 and 9.

6. $x + 2y = 8$ and $2x + y = 10$

7. (a) Because it eliminates the unknown x , leaving an equation in y only.

(b) $3y = 6$
 $y = 2$, $x = 3$

8. (a) $x = 3$, $y = 1$ (b) $x = 5$, $y = 2$ (c) $x = 7$, $y = 2$
 (d) $x = 11$, $y = -4$ (e) $x = 9$, $y = 3$ (f) $x = 10$, $y = 3$

9. (a) Because it eliminates x , leaving an equation in y only. (b) $x = 11$, $y = 1$

10. (a) $x = 1$, $y = 3$ (b) $x = 5$, $y = 3$ (c) $x = 5$, $y = 1$
 (d) $x = 7$, $y = 1$ (e) $x = 20$, $y = 2$ (f) $x = 7$, $y = 2$

5.5

Answers

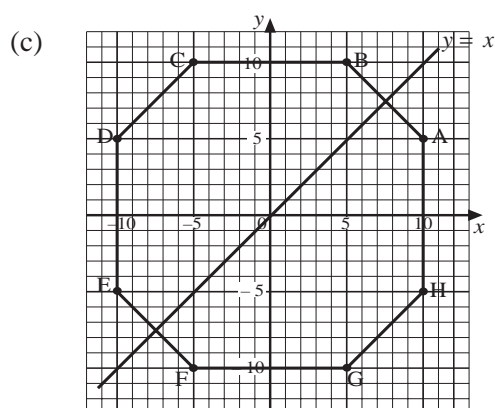
11. (a) Line A has gradient (for example) $\frac{-8}{4} = -2$ and it has intercept 8, so the equation is $y = -2x + 8$, i.e. $2x + y = 8$.

(b) $x = 8 - x$ or $x + y = 8$

- (d) Any suitable method leading to $x = 1\frac{1}{2}$, $y = 4$.

12. (a) $y = -10$

- (b) ... the line through A and B.

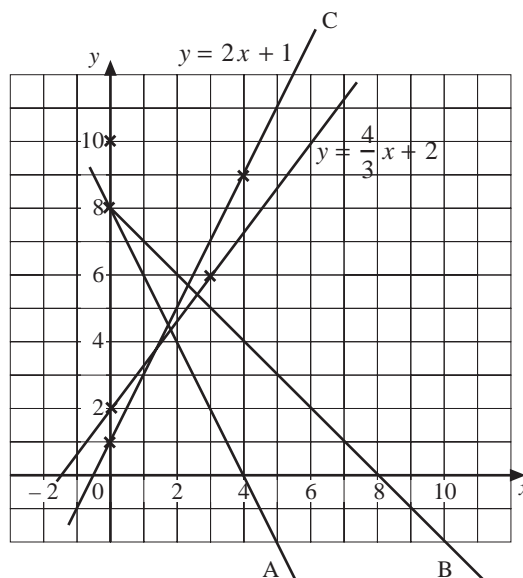


- (d) One of: $y = -x$
 $x = 0$
 $y = 0$

- (e) Any suitable method to obtain $x = 35$, $y = 20$.

- (f) ... G and H at $(35, 20)$.

(c)



5.6 Equations in Context

1. (a) $\pounds 9n$ (b) $n = 12$

2. (a) $c = 0.5m + 20$ (b) $c = 0.5m + 40$

- (c) $68.50 = 0.5m + 40$ $m = 57$ miles

3. $x + (x + 2) = 100$, i.e. $2x + 2 = 100$, giving $x = 49$

4. $25 + 4m = 39$ Distance travelled was 3.5 miles.

5. (a) $\pounds 3.60$ (b) $\pounds 0.045x$ per gallon (c) 92 pence per litre

5.6

Answers

6. (a) $\text{Area} = 10x \text{ m}^2$ (b) $10x = 16$, giving $x = 1.6$
 (c) $\text{Perimeter} = (2x + 20) \text{ m}$ (d) $2x + 20 = 39$, giving $x = 9.5 \text{ m}$
7. (a) $\text{Cost} = \pounds(15n + 25)$
 (b) $15n + 25 = 52.5$, giving $n = 1\frac{5}{6}$ hours, i.e. the repair took 1 hour 50 minutes
8. (a) $\text{Number of Fr} = 9(x - 2)$
 (b) $9x(x - 2) = 900$, giving $x = 102$, i.e. you need $\pounds 102$ to get 900 Fr.
9. (a) $\text{Perimeter} = 12x$ (b) $x = 23 \text{ m}$ (c) $\text{Area} = 6x^2$ (d) $x = 1.2 \text{ m}$
10. (a) $\text{Perimeter} = (20 + 2x) \text{ m}$ (b) $x = 1.5 \text{ m}$
11. (a) 350 km per hour
 (b) Because the third section (Brussels to Madrid) has a steeper gradient than the first section (London to Brussels).
 (c)

