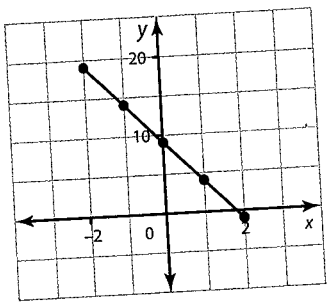
Connect and Reflect

Key Ideas

- You can represent discrete linear data on graphs using points that are not connected. If the linear relationship exists for all points between or beyond the given points, then you can connect the points using a straight line.
- You can graph a linear relation represented by an equation.
  - Use the equation to make a table of values.
  - Graph using the ordered pairs in the table. The graph of a linear relation forms a straight line.
- You can use graphs to solve problems by finding values between and beyond the plotted points.

$k = -5j + 9$

j	k
−2	19
−1	14
0	9
1	4
2	−1



Practise

For help with #1 to #4, refer to Example 1 on pages 189–191.

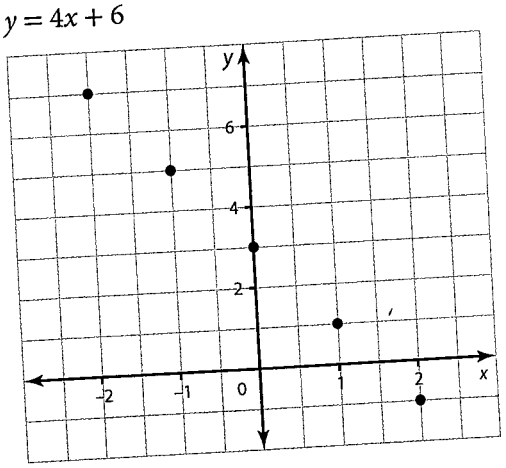
1. Match each linear equation to the graph.

a) $y = 5x$

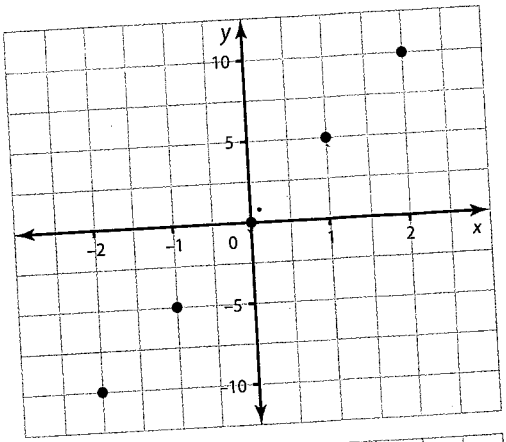
b) $y = -2x + 3$

c) $y = 4x + 6$

A



B



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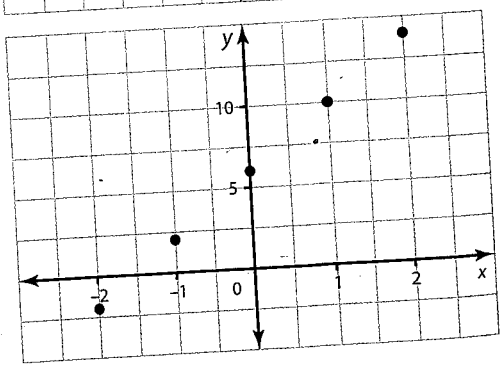


2. Ian works part-time selling games. He earns \$11/h. The equation $p = 11t$ models the relationship between his pay, p, and the time he works, t.

a) Show the relationship on a graph.

b) Explain how you know the graph represents the equation.

c) Ian works 8 h in one week. Use two methods to determine his pay.

3. Andrea drives at an average speed of 85 km/h. The equation relating distance, d, and time, t, is $d = 85t$.

a) Show the relationship on a graph.

b) How long does it take Andrea to drive 300 km?

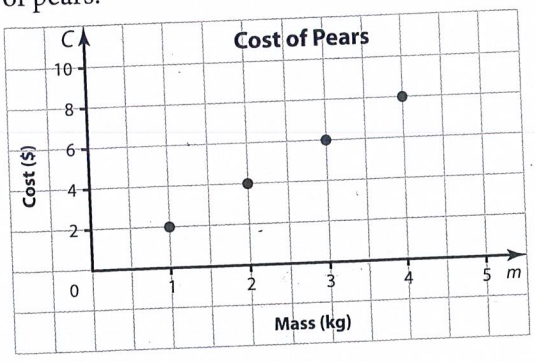
4. Create a table of values and a graph for each linear equation.

a) $r = -3s + 4$

b) $m = 5k + 13$

For help with #5 to #9, refer to Example 2 on pages 192–193.

5. The graph shows the relationship between the cost, C, in dollars and the mass, m, in kilograms of pears.

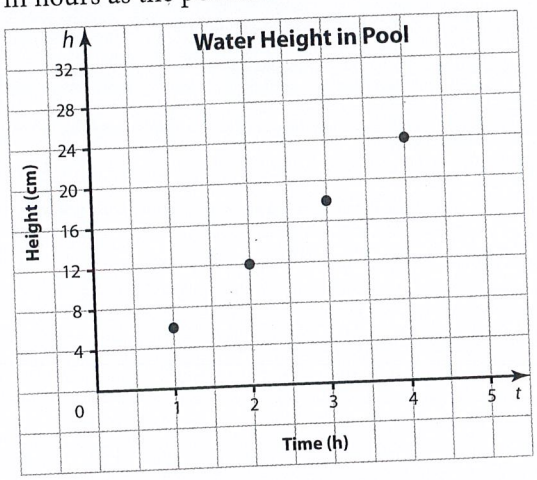


a) What is the linear equation?

b) How much could you buy for \$5?

c) Is it appropriate to identify values on this graph that are between or beyond the plotted points? Explain.

6. The graph represents the relationship between the height of water in a pool, h, and the time, t, in hours as the pool fills.



a) Determine the linear equation.

b) What is the height of the water after 5 h?

c) Is it appropriate to identify values on this graph that are between or beyond the plotted points? Explain.

7. Create a graph and a linear equation to represent each table of values.

a)

x	y
−3	−10
−2	−7
−1	−4
0	−1
1	2
2	5
3	8

b)

x	y
−3	−2
−2	−1
−1	0
0	1
1	2
2	3
3	4

c)

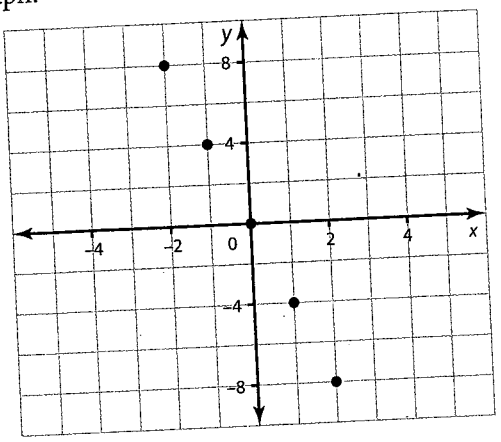
h	n
−3	−2
−2	0
−1	2
0	4
1	6
2	8
3	10

d)

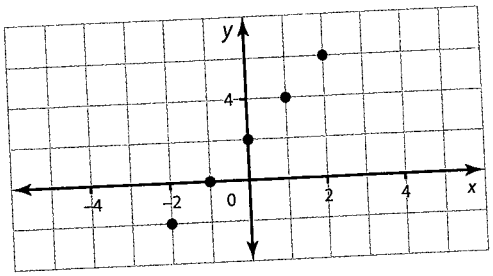
h	n
−3	0
−2	−3
−1	−6
0	−9
1	−12
2	−15
3	−18

8. Determine the linear equation that models each graph.

a)

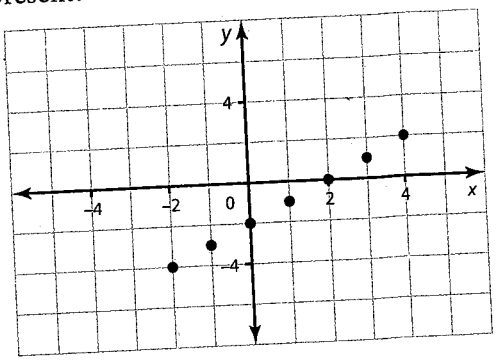


b)

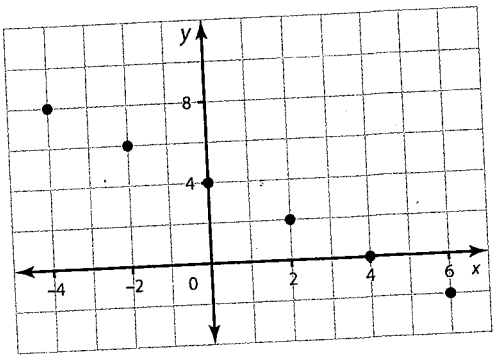


9. What linear equation does each graph represent?

a)



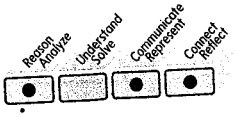
b)



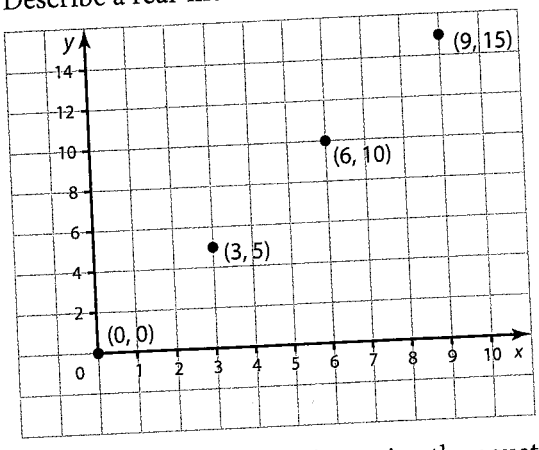
Apply

10. You are given a linear equation. Describe the process you would follow to represent the equation on a graph. Use an example to support your answer.

11. ✓ **Competency Check**



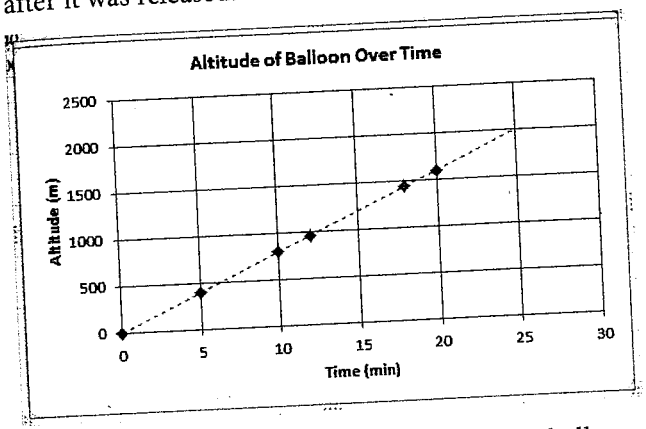
a) Describe a real-life situation that the data on this graph could represent.



b) Explain how you would determine the equation that represents the graph. Share your explanation with a classmate.

c) Can you use this graph to determine values between or beyond the plotted points? Explain your thinking.

12. The graph represents the altitude of a hot-air balloon during the first 20 min after it was released.



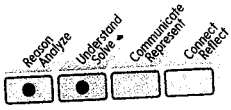
a) What was the approximate altitude of the balloon after 15 min?

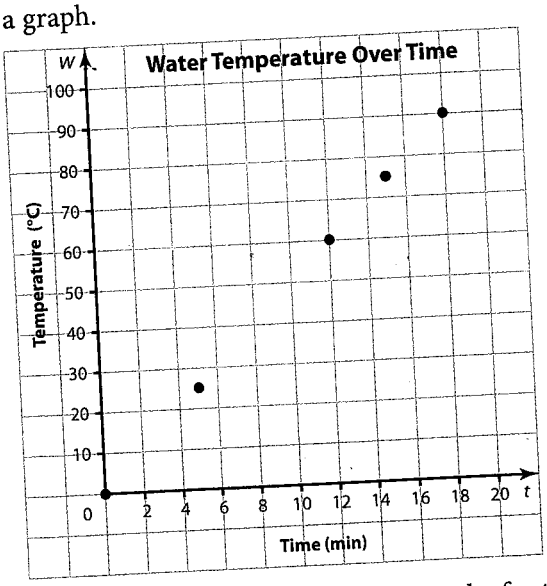
b) Estimate how long it takes for the balloon to rise to an altitude of 1 km.

c) What linear equation models the graph?

d) How fast is the balloon rising?

13. Sanjay conducts an experiment to determine how long it takes to heat a pot of water from 1 °C to its boiling point at 100 °C. He plots his data on a graph.





a) Approximately how long does it take for the water to reach the boiling point? Explain how you arrived at your answer.

b) What is the temperature of the water after 10 min?

c) At what rate does the water temperature increase? Explain how you arrived at your answer.

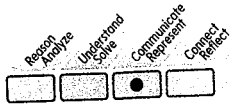
14. The approximate relationship between degrees Celsius (°C) and Kelvin (K) is modelled by the equation $K = C + 273$.

a) Graph the relationship for values between −50 °C and 120 °C.

b) Water boils at 100 °C. What is this temperature in Kelvin?

c) Water freezes at 0 °C. How did you represent this on your graph?

15. Scuba divers experience an increase in pressure as they descend. The equation $P = 10d + 102$ models the relationship between pressure and depth, where P is the pressure, in kilopascals, and d is the depth below the water surface, in metres.



a) Graph the relationship for the first 50 m of diving depth.

b) What is the approximate pressure at a depth of 15 m? Verify your answer.

c) The maximum pressure a scuba diver should experience is about 500 kPa. At what depth does this occur? Verify your answer.

The abbreviation for kilopascals is kPa.

d) What does "+ 102" represent in the equation? How is it represented on the graph?

Extend

16. Paul drives from Vancouver to Kelowna. He uses a table to record the data.

Time, t (h)	Distance, d (km)
0.5	45
0.9	81
1.2	108
1.5	135
2.3	207
2.7	243
3.5	315

a) Graph the linear relation.

b) How far did Paul drive in the first 2 h?

c) How long did it take Paul to drive 220 km?

d) Write the equation that relates time and distance.

e) What was Paul's average driving speed?