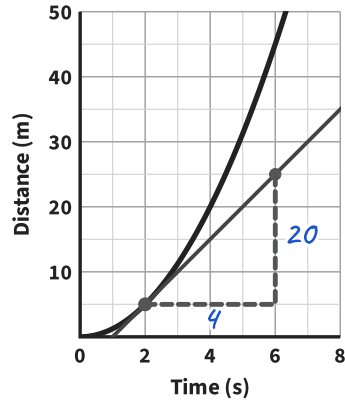


Gradient of a Curve

ANSWERS

1 gradient of the tangent = rate at that point

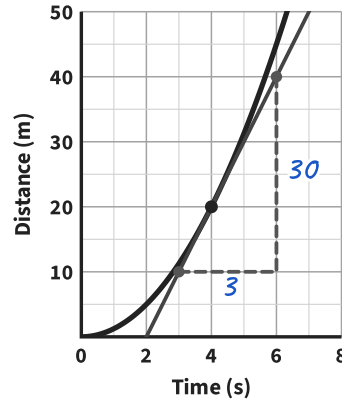
Find the speed at 2 seconds.



$$20 \div 4 = 5 \text{ m/s}$$

2

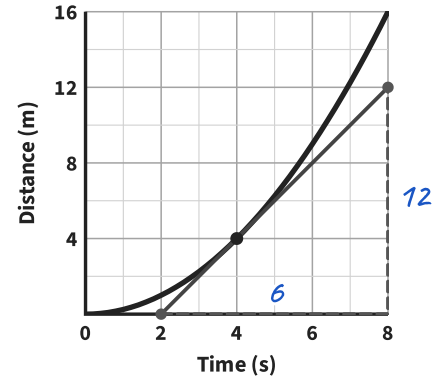
Find the speed at 4 seconds.



$$30 \div 3 = 10 \text{ m/s}$$

3

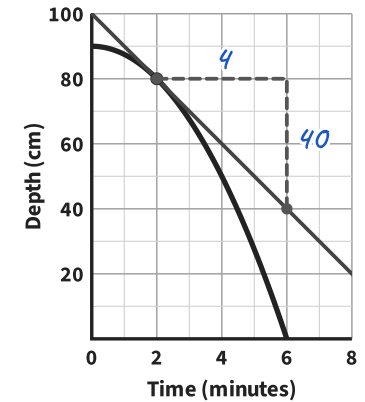
Find the speed at 4 seconds.



$$12 \div 6 = 2 \text{ m/s}$$

4

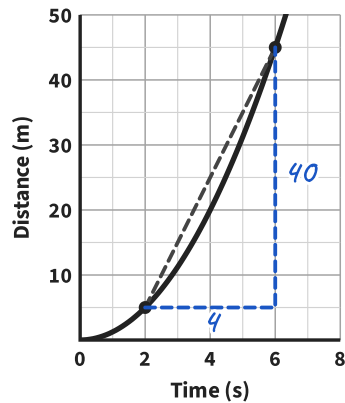
Find how fast the depth is falling at 2 minutes.



$$40 \div 4 = 10 \text{ cm per minute}$$

5 Notice the change!

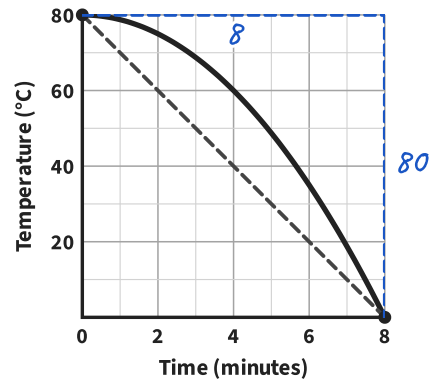
Find the average speed between 2 and 6 seconds. Use the dashed line.



$$40 \div 4 = 10 \text{ m/s}$$

6

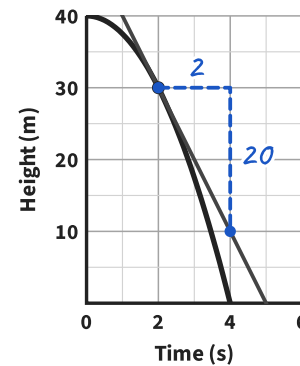
Find the average rate the temperature falls between 0 and 8 minutes.



$$80 \div 8 = 10 \text{ }^{\circ}\text{C per minute}$$

7

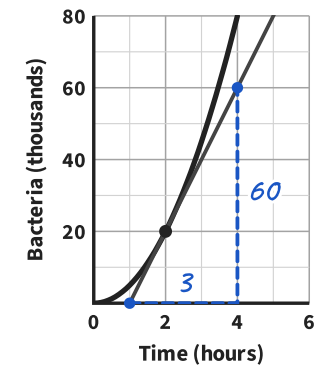
Find how fast the ball is falling at 2 seconds.



$$20 \div 2 = 10 \text{ m/s}$$

8

Find the rate of growth at 2 hours.



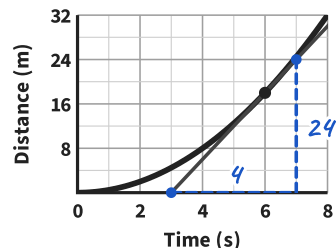
$$60 \div 3 = 20 \text{ thousand per hour}$$

Gradient of a Curve *further practice*

ANSWERS

9

Find the speed at 6 seconds.

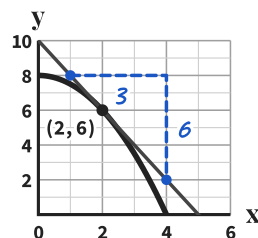


$$24 \div 4$$

Speed 6 m/s

10

The tangent to the curve at (2, 6) is drawn. Find the gradient of the curve at (2, 6).

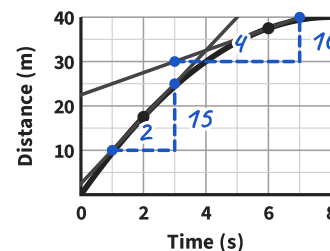


$$\text{down } 6, \text{ across } 3, -6 \div 3$$

Gradient -2

11

A runner's distance, with tangents at 2 and 6 seconds. Her speed at 2 seconds is how many times her speed at 6 seconds?

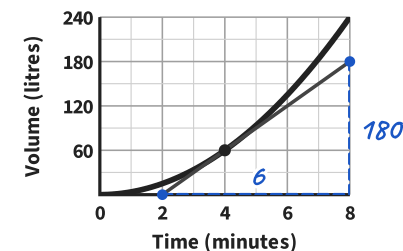


$$15 \div 2 = 7.5 \text{ m/s}, 10 \div 4 = 2.5 \text{ m/s}$$

Answer 3 times

12

The graph shows the water in a tank. Find the rate it is filling at 4 minutes, in litres per second.

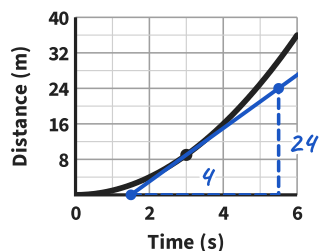


$$180 \div 6 = 30 \text{ litres per minute}, 30 \div 60$$

Rate 0.5 litres per second

13

Draw a tangent to the curve at 3 seconds. Use it to estimate the speed at 3 seconds.

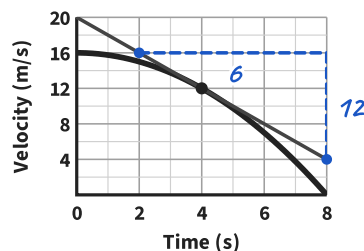


$$24 \div 4 \text{ (accept 5 to 7)}$$

Speed about 6 m/s

14

A car brakes. Find how fast its velocity is falling at 4 seconds, in m/s per second.

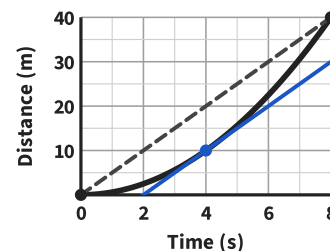


$$12 \div 6$$

Rate 2 m/s per second

15

Use the dashed line to find the average speed over 8 seconds. Estimate when the speed equals this average.

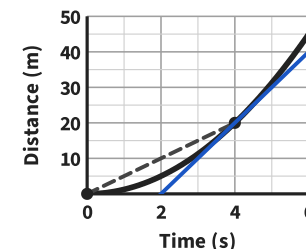


$$40 \div 8 = 5, \text{ parallel tangent at } 4 \text{ s}$$

Answer 5 m/s, about 4 s

16

Ben uses the dashed line to say the speed at 4 seconds is $20 \div 4 = 5 \text{ m/s}$. Is he right? Explain.



a chord gives the average speed, the tangent at 4 s is steeper

Answer No, it is about 10 m/s