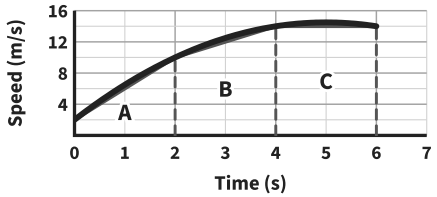
Speed-time graphs: area under a curve

ANSWERS

1

Use 3 equal strips to estimate the distance travelled in the first 6 seconds.



width = 6 ÷ 3 = 2 s

heights 2, 10, 14, 14 m/s

A = ½(2 + 10) × 2 = 12

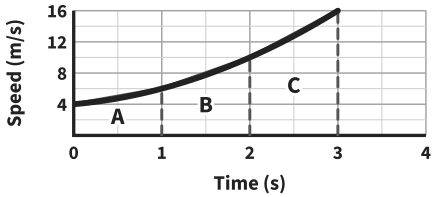
B = ½(10 + 14) × 2 = 24

C = ½(14 + 14) × 2 = 28

Distance ≈ 64 m

2

Use 3 equal strips to estimate the distance travelled in the first 3 seconds.



width = 3 ÷ 3 = 1 s

heights 4, 6, 10, 16 m/s

A = ½(4 + 6) × 1 = 5

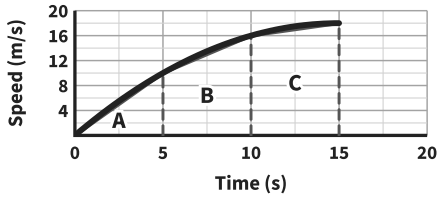
B = ½(6 + 10) × 1 = 8

C = ½(10 + 16) × 1 = 13

Distance ≈ 26 m

3

Use 3 equal strips to estimate the distance travelled in the first 15 seconds.



width = 15 ÷ 3 = 5 s

heights 0, 10, 16, 18 m/s

A = ½(0 + 10) × 5 = 25

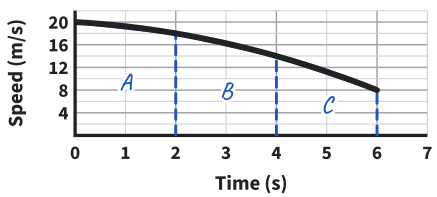
B = ½(10 + 16) × 5 = 65

C = ½(16 + 18) × 5 = 85

Distance ≈ 175 m

4

Draw 3 equal strips. Estimate the distance travelled in the first 6 seconds.



width = 6 ÷ 3 = 2 s

heights 20, 18, 14, 8 m/s

A = ½(20 + 18) × 2 = 38

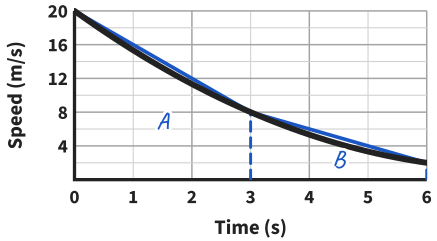
B = ½(18 + 14) × 2 = 32

C = ½(14 + 8) × 2 = 22

Distance ≈ 92 m

5

Use 2 strips to estimate the distance travelled in the first 6 seconds.
Is your estimate an underestimate or an overestimate?



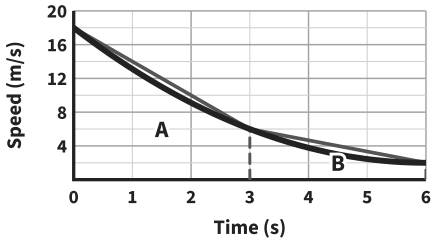
½(20 + 8) × 3 = 42, ½(8 + 2) × 3 = 15

57 m: the curve bends up, so over

Distance 57 m, over

6

Leo uses 2 strips and gets 48 m.
He says: "The speed goes down, so 48 m is an underestimate." Explain why Leo is wrong.



The curve bends up, so the tops sit above it: 48 m is an overestimate

48 m is an over

7

The table shows a scooter's speed every 2 seconds. Use it to estimate the distance travelled in 8 seconds.

Time (s)	0	2	4	6	8
Speed (m/s)	0	5	8	9	8

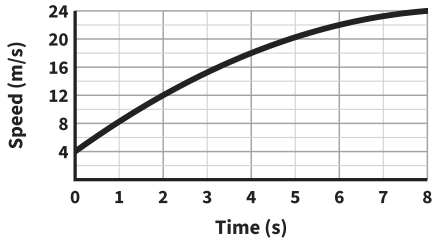
5 + 13 + 17 + 17

= 52

Distance ≈ 52 m

8

Mia uses 2 strips and Sam uses 4 strips to estimate the distance in the first 8 seconds. Work out both. Whose is closer to the real distance?



Mia 44 + 84 = 128 m

Sam 16 + 30 + 40 + 46 = 132 m

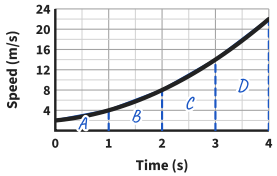
Closer Sam's

Speed-time graphs: area under a curve *further practice*

ANSWERS

9

Use 4 strips to estimate the distance travelled in the first 4 seconds. Is it an underestimate or an overestimate?



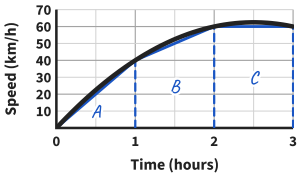
3 + 6 + 11 + 18 = 38

bends up: tops above, over

Answer 38 m, over

10

The graph shows a coach's speed. Use 3 strips to estimate how far it travels in 3 hours. Give your answer in km.



strips of 1 hour: 20 + 50 + 60

km/h × hours = km

Answer 130 km

11

The table shows a skater's speed. Using 3 strips, Ana estimates the distance as 65 m. Find v.

Time (s)	0	2	4	6
Speed (m/s)	3	v	13	16

(3 + v) + (v + 13) + (13 + 16) = 65

2v + 45 = 65, v = 10

Answer $v = 10$

12

Two runners start together. The table shows their speeds. Use 3 strips for each to estimate who runs further in 6 seconds, and by how much.

Time (s)	0	2	4	6
Jas (m/s)	0	6	8	9
Ola (m/s)	0	4	7	10

Jas: 6 + 14 + 17 = 37 m

Ola: 4 + 11 + 17 = 32 m

Answer Jas, by 5 m

13

The table shows a drone's speed. Use 4 strips to estimate its average speed over the 20 seconds.

Time (s)	0	5	10	15	20
Speed (m/s)	4	10	14	16	16

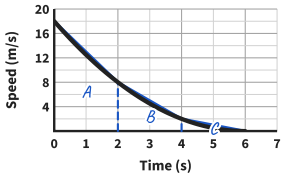
35 + 60 + 75 + 80 = 250 m

250 ÷ 20 = 12.5

Answer 12.5 m/s

14

A car brakes and must stop within 40 m. Use 3 strips to estimate its stopping distance. Can you be sure it stops in time? Explain.



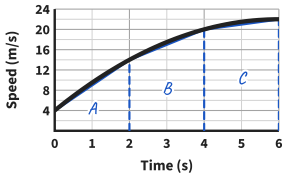
26 + 10 + 2 = 38 m, an overestimate

so the real distance is under 38 m

Answer Yes

15

Nia splits the first 6 seconds into strips from 0 to 1 and 1 to 6. Explain why this is a poor choice. Then use 3 equal strips to estimate the distance.



the wide strip's top is far from the curve

18 + 34 + 42 = 94

Answer 94 m

16

A speed-time graph bends down. With 2 strips the estimate is 100 m, and with 4 strips it is 104 m. Could the real distance be 103 m? Explain.

both are underestimates,

so the real distance is more than 104 m

Answer No