

Foundation GCSE: Graphs and Equations Problems

Name: _____

Class: _____

Instructions: Answer all questions. Questions are ordered from easiest (1) to hardest (20). Working out should be shown where appropriate.

1. A conversion graph shows that 5 miles is approximately 8 kilometres. Convert 25 miles into kilometres.
2. A car travels at a constant speed of 60 mph for 2 hours. Calculate the total distance travelled.
3. On a distance-time graph, what does a horizontal straight line represent?
4. Calculate the speed represented by a distance-time graph section with rise 120 miles and run 2 hours.
5. A train accelerates from rest to 30 m/s in 10 seconds. Calculate its acceleration.
6. On a speed-time graph, what does the gradient of the line represent?
7. On a speed-time graph, what does the area under the graph represent?
8. A car travels 150 miles in 3 hours. Calculate its average speed.
9. A conversion graph for pounds (£) to Euros (€) has gradient 1.2. How many Euros for 50?
10. Calculate the distance travelled by a cyclist moving at 12 km/h for 30 minutes.
11. A bus travels 180 km at an average speed of 60 km/h. How long does the journey take?
12. On a distance-time graph, what does a steeper straight line indicate?
13. A particle's speed increases from 10 m/s to 25 m/s in 5 seconds. Find acceleration.
14. Calculate the area under a speed-time graph consisting of a rectangle of width 4 s and height 10 m/s.
15. A car's journey is represented by a distance-time graph. If it travels 60 km in 45 minutes, find speed in km/h.
16. Find the gradient of a distance-time graph where distance goes from 0 to 150 km over 3 hours.
17. A cyclist accelerates uniformly from 0 to 8 m/s in 4 seconds. Calculate acceleration.
18. Calculate the total distance for a journey with two stages: 40 mph for 2 hours, then 60 mph for 1 hour.
19. A speed-time graph shows a constant speed of 20 m/s for 5 seconds. Calculate the distance covered.
20. A car travels at 50 km/h for 3 hours and then stops for 1 hour. What is the total distance travelled?

Answers & Worked Solutions

1. 40 km – Scaling factor: 25 miles is 5 times 5 miles, so $8 \times 5 = 40$.
2. 120 miles – Distance = Speed $\times$ Time = $60 \times 2 = 120$.
3. Stationary (the object is at rest / not moving).
4. 60 mph – Speed = $\frac{120}{2} = 60$.
5. 3 m/s^2 – Acceleration = $\frac{\text{Change in speed}}{\text{Time}} = \frac{30}{10} = 3$.
6. Acceleration.
7. Total distance travelled.
8. 50 mph – Speed = $\frac{150}{3} = 50$.
9. €60 – $50 \times 1.2 = 60$.
10. 6 km – Distance = $12 \times 0.5 = 6$.
11. 3 hours – Time = $\frac{\text{Distance}}{\text{Speed}} = \frac{180}{60} = 3$.
12. A higher (faster) constant speed.
13. 3 m/s^2 – $\frac{25 - 10}{5} = \frac{15}{5} = 3$.
14. 40 metres – Area = $4 \times 10 = 40$.
15. 80 km/h – 45 mins = 0.75 hours, Speed = $\frac{60}{0.75} = 80$.
16. 50 km/h – Gradient = $\frac{150}{3} = 50$.
17. 2 m/s^2 – $\frac{8 - 0}{4} = 2$.
18. 140 miles – Stage 1: $40 \times 2 = 80$; Stage 2: $60 \times 1 = 60$; Total = $80 + 60 = 140$.
19. 100 metres – Distance = $20 \times 5 = 100$.
20. 150 km – Only moving during the first 3 hours: $50 \times 3 = 150$ (stationary period contributes 0 distance).