G3 MATHEMATICS HOLIDAY REVISION

Week 3

Graphs and applications

Student worksheet

Upper Secondary - Sec 3 and Sec 4

12 original questions

Show your working. Choose a method, keep track of restrictions and check that your answer fits the question.

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STUDENT WORKSHEET

Week 3 · Graphs and applications

WARM-UPS

Q1

[4 marks]

A line passes through $(-2,3)$ and $(4,-1)$. Find its gradient, equation and x-intercept.

WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

WARM-UPS

Q2

[3 marks]

A price rises by 10% and then falls by 10%. Find the final price if it began at $200, and explain why it does not return to $200.

WORKING SPACE

STUDENT WORKSHEET

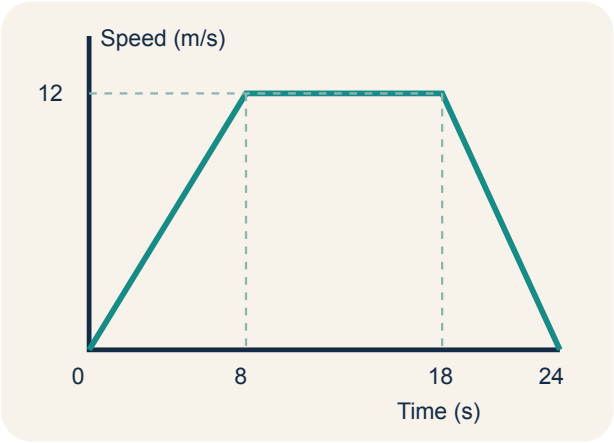
Week 3 · Graphs and applications

CORE APPLICATIONS

Q3

[5 marks]

A speed–time graph joins (0 s,0 m/s), (8 s,12 m/s), (18 s,12 m/s) and (24 s,0 m/s) with straight segments. Find the total distance and average speed over 24 s.



WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

CORE APPLICATIONS

Q4

[4 marks]

A jacket's price is reduced by 20%, then a 10% surcharge is applied to the reduced price. The final price is $88. Find the original price and check it forward.

WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

CORE APPLICATIONS

Q5

[4 marks]

In a grouped table, masses 0–<10 g, 10–<20 g and 20–<30 g have frequencies 4, 6 and 10. Estimate the mean mass and identify the modal class. Explain why the mean is an estimate.

WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

CORE APPLICATIONS

Q6

[4 marks]

Two mobile plans have monthly costs $A(t) = 8 + 0.20t$ dollars and $B(t) = 20$ dollars for t minutes of calls, with $t \geq 0$. Find when their costs are equal and when B is cheaper. Interpret the boundary.

WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

CHALLENGING REASONING

Q7

[5 marks]

A(0,0), B(6,0) and C(2,5) are vertices of a triangle. Find its area, the midpoint M of BC and the equation of AM.

WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

CHALLENGING REASONING

Q8

[5 marks]

A cyclist travels 60 km outward at 30 km/h, rests for 1 hour, then returns 60 km at 60 km/h. Find the total elapsed time, average speed for the whole trip and average speed while moving.

WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

CHALLENGING REASONING

Q9

[6 marks]

For $y = x^2 - 4x - 5$, find the x-intercepts and turning point. Find where the curve meets the line $y = -5$. State which features can be read exactly from algebra without a scale drawing.

WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

MISCONCEPTION ANALYSIS

Q10

[4 marks]

Two classes have five-number summaries (minimum, Q1, median, Q3, maximum). Class A: 30, 42, 50, 58, 70. Class B: 25, 48, 52, 56, 80. Compare their medians and the spread of the middle half. Can you conclude which class has the greater mean?

WORKING SPACE

STUDENT WORKSHEET

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MISCONCEPTION ANALYSIS

Q11

[4 marks]

On a speed–time graph, a horizontal segment at 12 m/s lasts from t = 8 s to t = 18 s. A student says the object was stopped for 10 s because the graph was horizontal. Explain the error, find the distance during the segment and state what a horizontal distance–time segment would mean.

WORKING SPACE

STUDENT WORKSHEET

Week 3 · Graphs and applications

STRETCH

Q12

[6 marks]

On one straight route, cyclist A starts at kilometre 0 and travels at 12 km/h. Cyclist B starts 6 km ahead, travels at 8 km/h for 1 hour, stops for 30 minutes, then resumes at 8 km/h. They start at the same time. Find when and where A first catches B, and who is ahead after 2 hours.

WORKING SPACE