

Yr 11 Maths Paper 7 (1 hour)



[3]

- 2. A long-distance train leaves its origin at 08:15 and arrives at its destination, 184km away at 12.29.
  - a. Calculate an estimation of the train's average speed in km/hr. [2]

b. Is the true speed of the train likely to be higher or lower than your estimate? You must explain your answer. [1]

- 3. A curve has the equation  $y = x^3 4x^2 + 7x 9$ .
  - a. Show that the curve passes through the point X, (-1, -21). [1]
  - b. Differentiate the equation to find  $\frac{dy}{dx}$ . [2]
  - c. Calculate the gradient of the curve at point X. [2]
- 4. In a bag of counters, the ratio of red counters to blue is 3:1. The ratio of blue to green counters is 2:5. Find the ratio of red to green counters in its simplest form. [3]

5. Prove algebraically that, for all integer values of x greater than zero, 2(x + 3) + 2x - 10 must be a multiple of 4. [3]

6. Solve:

$$\frac{2x+2}{4-x} = 6$$
 [2]

7. The graph below shows the number of frogs in a lake (on the y-axis) plotted against the number of days after measurements began (on the *x*-axis).



Use the graph to estimate:

- a. The number of frogs in the lake at the start of the measurements. [1]
- b. The number of days it took for the number of frogs to increase from 500 to 1000.

[2]

c. The percentage change in the number of frogs between day 6 and day 10. [2]

8. In the diagram, angle OAB is 19°. Find angle ACB, giving your reasons for each stage of your working.



9. The graph shows the data of a survey of the heights of trees in a wood, measured in metres.



There are 200 trees between 20 and 25m high.

a. How many trees were included in the survey?

[3]

[3]

b. Estimate how many trees in the wood are more than 35 metres tall. [2]

10. A long distance runner is training for a race. She runs 26 km at a constant speed of 6 kph, then speeds up for the final 15km, running at a speed of 9 kph. What is her average speed for the whole run? [4]

11.

a.  $64^{a} \times 16^{(b-2)} = 4^{2a}$ . Derive and simplify an expression for a in terms of b. [3]

- b. Evaluate: i.  $11^{0}$ [1] ii.  $(2^{3})^{2}$ [1] iii.  $(\frac{64}{27})^{-\frac{1}{3}}$ 
  - [2]

12. ABC is a triangle.

- AB = 3**a**.
- AC = 2**b**.

D is the point on BC such that BD:DC = 4:1.



Find the vector AD in terms of **a** and **b**.

[3]