# Dr Oliver Mathematics
# Mathematics Standard Grade: Credit Level
# 2008 Paper 1: Non-Calculator
# 55 minutes

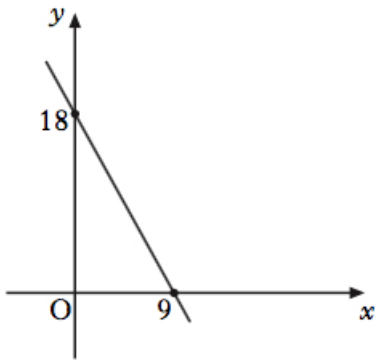
The total number of marks available is 39.
You must write down all the stages in your working.

1. Evaluate (2)
$$24.7 - 0.63 \times 30.$$

2. Factorise fully (2)
$$5x^2 - 45.$$

3. (2)
$$W = BH^2.$$
Change the subject of the formula to $H$.

4. A straight line cuts the $x$-axis at the point $(9, 0)$ and the $y$-axis at the point $(0, 18)$, as shown. (3)




Find the equation of this line.

5. Express as a single fraction in its simplest form (2)
$$\frac{1}{p} + \frac{2}{p+5}.$$

6. Jane enters a two-part race.

(a) She cycles for 2 hours at a speed of $(x + 8)$ kilometres per hour. (1)
Write down an expression in $x$ for the distance cycled.

(b) She then runs for 30 minutes at a speed of $x$ kilometres per hour. (1)
Write down an expression in $x$ for the distance run.

(c) The **total** distance of the race is 46 kilometres. (3)
Calculate Jane's **running** speed.

7. The 4th term of each number pattern below is the **mean** of the previous three terms.

(a) When the first three terms are 1, 6, and 8, calculate the 4th term. (1)

(b) When the first three terms are $x$, $(x + 7)$ and $(x + 11)$, calculate the 4th term. (1)

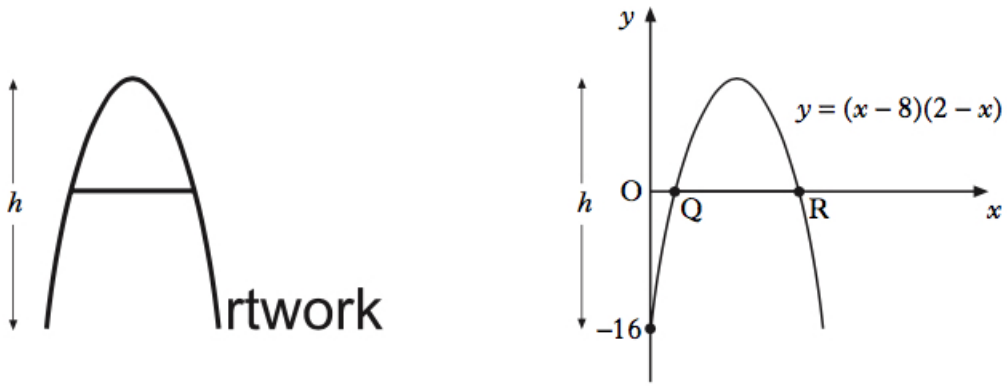
(c) When the first, second and fourth terms are (2)

$$-2x, \quad (x + 5), \quad \ldots\ldots, \quad (2x + 4),$$

calculate the 3rd term.

8. The curved part of the letter A in the *Artwork* logo is in the shape of a parabola.
The equation of this parabola is

$$y = (x - 8)(2 - x).$$



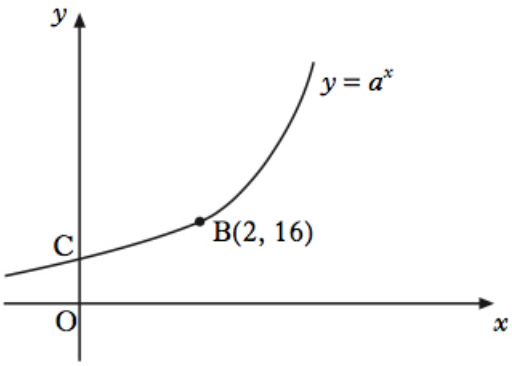

(a) Write down the coordinates of $Q$ and $R$. (2)

(b) Calculate the height, $h$, of the letter A. (3)

9. Simplify (2)

$$m^3 \times \sqrt{m}.$$

10. Part of the graph of $y = a^x$, where $a > 0$, is shown below.



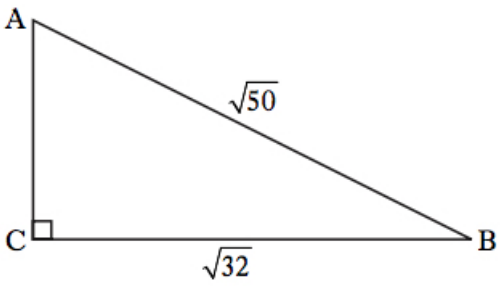

The graph cuts the $y$-axis at $C$.

(a) Write down the coordinates of $C$. (1)

$B$ is the point $(2, 16)$.

(b) Calculate the value of $a$. (2)

11. A right-angled triangle has dimensions as shown. (3)




Calculate the length of $AC$, leaving your answer as a surd **in its simplest form**.

12. Given that (3)

$$x^2 - 10x + 18 = (x - a)^2 + b,$$

find the values of $a$ and $b$.

13. A new fraction is obtained by adding $x$ to the numerator and denominator of the fraction $\frac{17}{24}$. (3)
This new fraction is equivalent to $\frac{2}{3}$.
Calculate the value of $x$.