Dr Oliver Mathematics
Mathematics Standard Grade: Credit Level
2011 Paper 1: Non-Calculator
55 minutes

The total number of marks available is 41.
You must write down all the stages in your working.

1. Evaluate (2)
$$2.4 + 5.46 \div 60.$$

2. Factorise fully (2)
$$2m^2 - 18.$$

3. Given that (2)
$$\mathrm{f}(x) = 5 - x^2,$$
evaluate $\mathrm{f}(-3)$.

4. Solve the equation (3)
$$3x + 1 = \frac{x - 5}{2}.$$

5. Jamie is going to bake cakes for a party. (3)
He needs $\frac{2}{5}$ of a block of butter for 1 cake.
He has 7 blocks of butter.
How many cakes can Jamie bake?

6. A driving examiner looks at her diary for the next 30 days.
She writes down the number of driving tests booked for each day as shown below.

Number of tests booked	0	1	2	3	4	5	6
Frequency	1	1	3	2	9	10	4

   (a) Find the median for this data. (2)

   (b) Find the probability that **more than** 4 tests are booked for one day. (1)

7. Brian, Molly, and their four children visit Waterworld.
The total cost of their tickets is £56.
Let a pounds be the cost of an adult's ticket and c pounds the cost of a child's ticket.

(a) Write down an equation in terms of a and c to illustrate this information. (1)

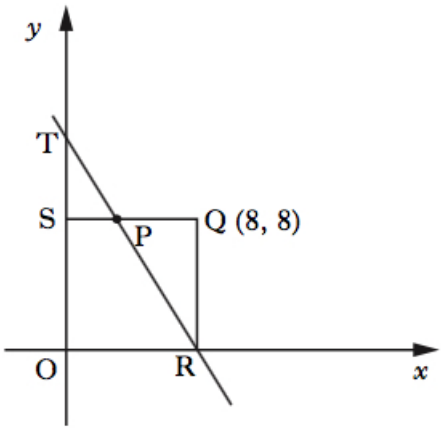
Sarah and her three children visit Waterworld.
The total cost of their tickets is £36.

(b) Write down another equation in terms of a and c to illustrate this information. (1)

(c) (i) Calculate the cost of a child's ticket. (2)

(ii) Calculate the cost of an adult's ticket. (1)

8. A square, $OSQR$, is shown below.



Q is the point $(8, 8)$.
The straight line TR cuts the y-axis at $T(0, 12)$ and the x-axis at R.

(a) Find the equation of the line TR. (3)

The line TR also cuts SQ at P.

(b) Find the coordinates of P. (4)

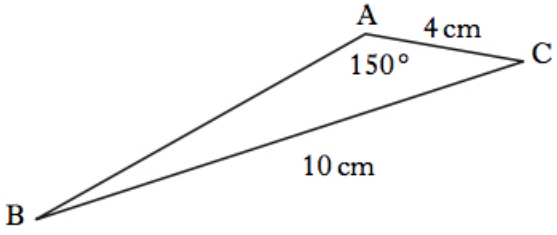
9. (a) Simplify (1)

$$2a \times a^{-4}.$$

(b) Solve for x, (3)

$$\sqrt{x} + \sqrt{18} = 4\sqrt{2}.$$

10. In triangle ABC, $AC = 4$ centimetres, $BC = 10$ centimetres, and angle $BAC = 150°$. (4)



Given that $\sin 30^\circ = \frac{1}{2}$, show that

$$\sin ABC = \tfrac{1}{5}.$$

11. F varies directly as s and inversely as the square of d.

    (a) Write down a relationship connecting F, s, and d. (1)

    (b) What is the effect on F when s is halved and d is doubled? (3)

12. The sums, S_2, S_3, and S_4 of the first 2, 3, and 4 natural numbers are given by

$$S_2 = 1 + 2 = \tfrac{1}{2}(2 \times 3) = 3$$
$$S_3 = 1 + 2 + 3 = \tfrac{1}{2}(3 \times 4) = 6$$
$$S_4 = 1 + 2 + 3 + 4 = \tfrac{1}{2}(4 \times 5) = 10.$$

    (a) Find S_{10}, the sum of the first 10 natural numbers. (1)

    (b) Write down the formula for the sum, S_n, of the first n natural numbers. (1)