

**Dr Oliver Mathematics**  
**Mathematics Standard Grade: Credit Level**  
**2010 Paper 1: Non-Calculator**  
**55 minutes**

The total number of marks available is 38.

You must write down all the stages in your working.

1. Evaluate (2)

$$40\% \text{ of } £11.50 - £1.81.$$

2. Evaluate (2)

$$\frac{2}{5} \div 1\frac{1}{10}.$$

3. Change the subject of the formula to  $s$ : (3)

$$t = \frac{7s + 4}{2}.$$

4. Two functions are given below.

$$f(x) = x^2 - 4x,$$

$$g(x) = 2x + 7.$$

- (a) If  $f(x) = g(x)$ , show that (2)

$$x^2 - 6x - 7 = 0.$$

- (b) Hence find **algebraically** the values of  $x$  for which  $f(x) = g(x)$ . (2)

5. A bag contains 27 marbles.

Some are black and some are white.

The probability that a marble chosen at random is black is  $\frac{4}{9}$ .

- (a) What is the probability that a marble chosen at random is white? (1)

- (b) How many white marbles are in the bag? (1)

6. Cleano washing powder is on special offer. (3)



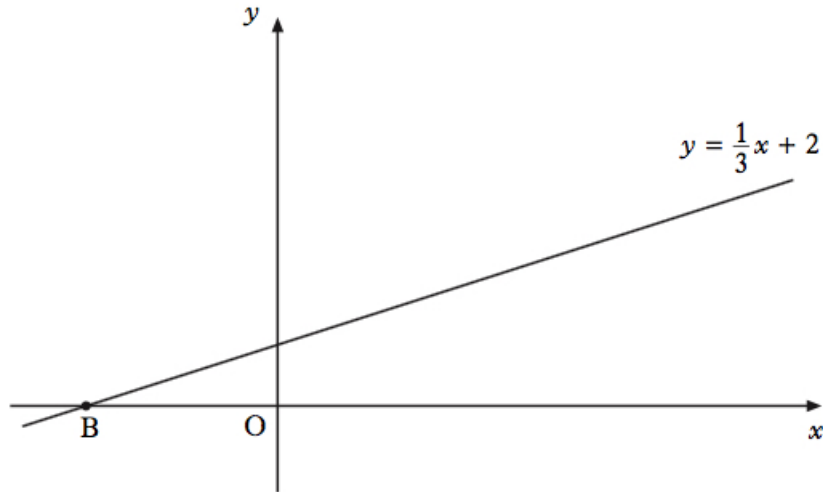
Each box on special offer contains 20% more powder than the standard box.  
A box on special offer contains 900 grams of powder.  
How many grams of powder does the standard box contain?

7. A straight line has equation  $y = mx + c$ , where  $m$  and  $c$  are constants.
- (a) The point  $(2, 7)$  lies on this line. (1)  
Write down an equation in  $m$  and  $c$  to illustrate this information.
  - (b) A second point  $(4, 17)$  also lies on this line. (1)  
Write down another equation in  $m$  and  $c$  to illustrate this information.
  - (c) Hence calculate the values of  $m$  and  $c$ . (3)
  - (d) Write down the gradient of this line. (1)
8. (a) Simplify (1)  
$$\sqrt{2} \times \sqrt{18}.$$
- (b) Simplify (1)  
$$\sqrt{2} + \sqrt{18}.$$
- (c) Hence show that (2)  
$$\frac{\sqrt{2} \times \sqrt{18}}{\sqrt{2} + \sqrt{18}} = \frac{3\sqrt{2}}{4}.$$

9. Part of the graph of the straight line with equation

$$y = \frac{1}{3}x + 2,$$

is shown below.



- (a) Find the coordinates of the point  $B$ . (2)
- (b) For what values of  $x$  is  $y < 0$ ? (1)

10. A number pattern is shown below.

$$1^3 = \frac{1^2 \times 2^2}{4},$$

$$1^3 + 2^3 = \frac{2^2 \times 3^2}{4},$$

$$1^3 + 2^3 + 3^3 = \frac{3^2 \times 4^2}{4}.$$

- (a) Write down a similar expression for (1)

$$1^3 + 2^3 + 3^3 + 4^3 + 5^3.$$

- (b) Write down a similar expression for (2)

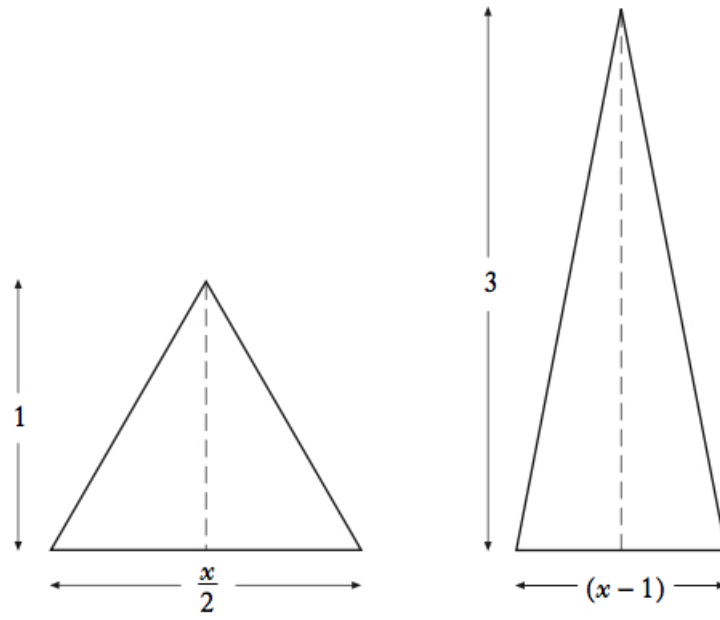
$$1^3 + 2^3 + 3^3 + \dots + n^3.$$

- (c) Hence **evaluate** (2)

$$1^3 + 2^3 + 3^3 + \dots + 9^3.$$

11. Two triangles have dimensions as shown. (4)

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The triangles are equal in area.  
**Calculate** the value of  $x$ .

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