

**Dr Oliver Mathematics**  
**AQA GCSE Mathematics**  
**2013 November Paper 1: Non-Calculator**  
**1 hour 30 minutes**

The total number of marks available is 70.

You must write down all the stages in your working.

1. This triangle is **drawn accurately**: it is a right-angled triangle, 6 cm by 4 cm. (3)



Work out the area of the triangle.

2. Theatre tickets cost £ $T$  each. (2)  
Cinema tickets cost £ $C$  each.

Write down an expression for the total cost of 20 theatre tickets and 16 cinema tickets.

3. (a) Multiply out (1)

$$3(2c - 1).$$

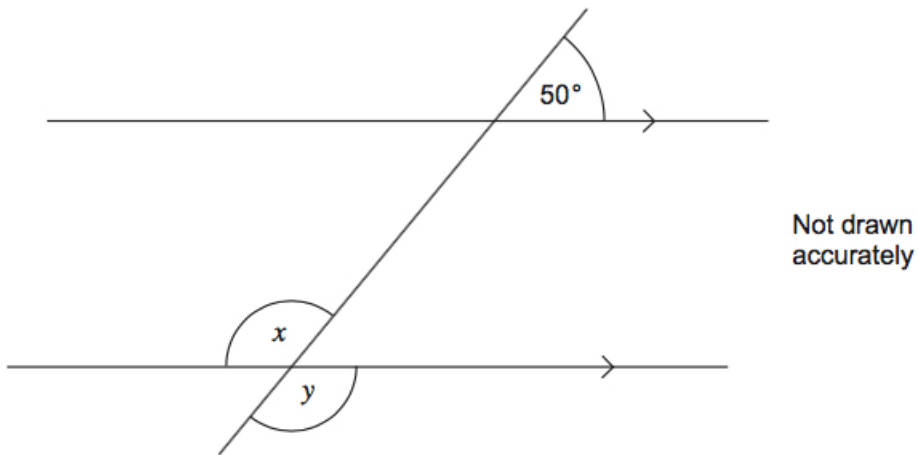
- (b) Solve (1)

$$\frac{x}{20} = 10.$$

- (c) Solve (3)

$$3y + 6 = 30 - 7y.$$

4. Here is a figure.



(a) Work out the size of angle  $x$ . (1)

(b) Which one of these describes angles  $x$  and  $y$ ? (1)  
Circle your answer.

alternate angles   corresponding angles   interior angles   vertically opposite angles

5.

$$E = mv^2.$$

(a) Work out the value of  $E$  when  $m = 3$  and  $v = 10$ . (2)

Julie and Phil rearrange

$$E = mv^2$$

to make  $v$  the subject.

Here are their answers.

**Julie**

$$E = mv^2$$
$$\frac{E}{m} = v^2$$
$$\sqrt{\frac{E}{m}} = v$$
$$v = \sqrt{\frac{E}{m}}$$

**Phil**

$$E = mv^2$$
$$\sqrt{E} = mv$$
$$\frac{\sqrt{E}}{m} = v$$
$$v = \frac{\sqrt{E}}{m}$$

Which student has rearranged the formula correctly?  
Tick a box.

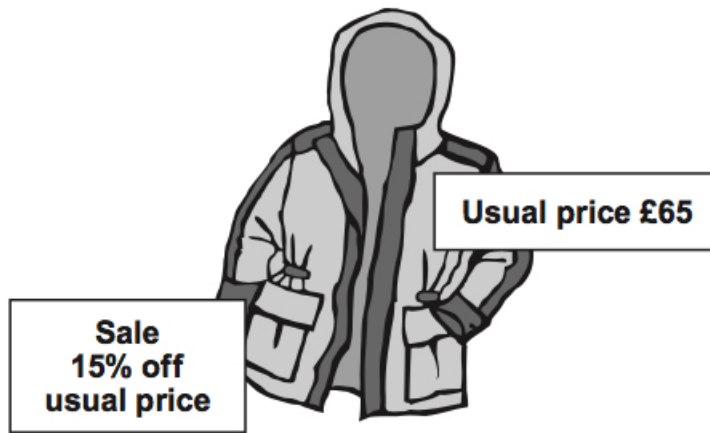
 Julie Phil

(b) What mistake has the other student made?

(2)

6. A jacket has been reduced in a sale.

(3)



Work out the sale price.

7. There are 24 counters in a bag. (3)  
One-third of the counters are blue.  
5 red, 5 white, and 5 blue counters are added to the bag.

Tom says, "The probability of taking a blue counter from the bag is still  $\frac{1}{3}$ ."

Is he correct?

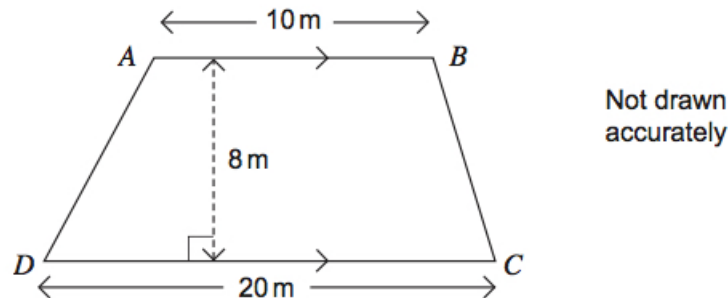
Tick a box.

Yes       No       Cannot tell

Give a reason for your answer.

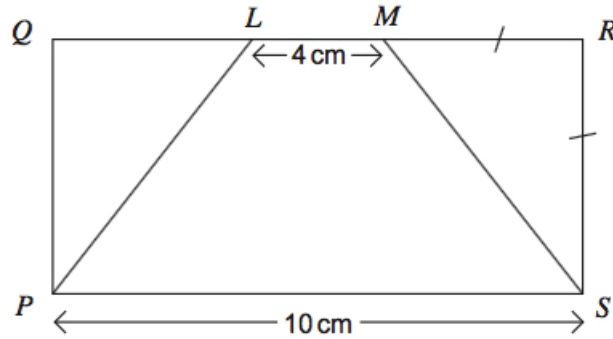
8. Which of these fractions is closest to  $\frac{3}{4}$ ? (3)  
 $\frac{2}{3}$        $\frac{3}{5}$        $\frac{7}{10}$        $\frac{13}{20}$

9. (a)  $ABCD$  is a trapezium. (3)



Calculate the area of  $ABCD$ .  
State the units of your answer.

- (b)  $PQRS$  is a rectangle. (3)  
 $LM = 4$  cm.  
 $PS = 10$  cm.  
 $MR = RS$ .



Not drawn accurately

The area of  $PLMS$  is  $21 \text{ cm}^2$ .  
Show that

$$QL = MR.$$

10. A fruit drink is made by mixing juice and lemonade in the ratio

$$\text{juice} : \text{lemonade} = 1 : 4.$$

Juice costs £6.00 per litre.

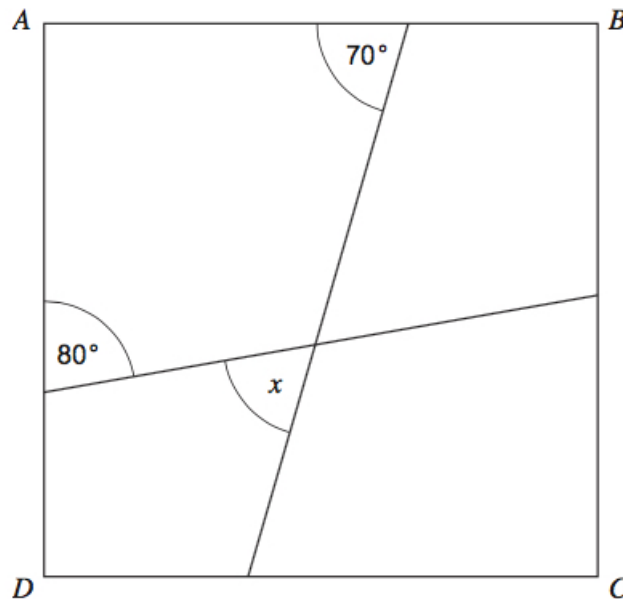
Lemonade costs 50p per litre.

(a) Show that 1 litre of the fruit drink costs £1.60 to make. (3)

(b) The fruit drink is sold for £2 a litre. (2)

Work out the percentage profit.

11.  $ABCD$  is a square. (4)



Not drawn accurately

Work out the size of angle  $x$ .

You must show your working, which may be on the diagram.

12. Jo teaches the violin. (4)  
Half of her students take violins home to practise.  
She wants to investigate the following hypothesis.

“Students who take violins home to practise score higher marks in violin exams.”

Use the data handling cycle to describe how Jo could carry out this investigation and test her hypothesis.

13. Solve the simultaneous equations (4)

$$2x - 3y = 7$$

$$3x + 4y = 2.$$

You **must** show your working.

Do **not** use trial and improvement.

14. A holiday park has three different areas to stay in.  
Each area has three different types of home.  
The table shows the number of families staying in the holiday park during the summer of 2013.

	Forest	Fields	Beach
Economy	55	50	60
Super	35	20	15
Luxury	10	30	25
Total	100	100	100

The manager sends a questionnaire to 60 families to ask them about their holiday.

The sample of size 60 is stratified by **type of home** and **area**.

- (a) How many families who stayed in a **Luxury** home in the **Forest** are sent a questionnaire? (2)
- (b) How many families who stayed in a **Super** home are sent a questionnaire? (2)
15. (a) Expand and simplify (2)  
 $(2x + 1)(3x - 4).$
- (b) Factorise (2)  
 $6x^2 - 23x - 4.$

16. A bag contains triangles and quadrilaterals in the ratio of the number of sides of each shape.

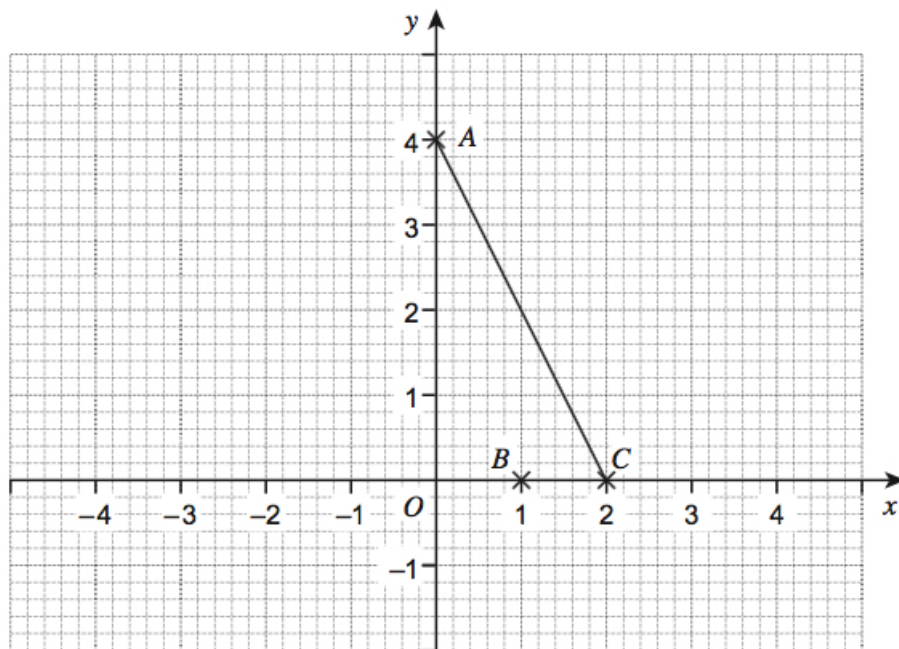
(a) Explain why the least number of shapes that could be in the bag is 7. (1)

(b) A shape is taken at random from the bag and **replaced**. (4)  
Another shape is then taken from the bag.

Work out the probability that the two shapes taken from the bag are of the same type.

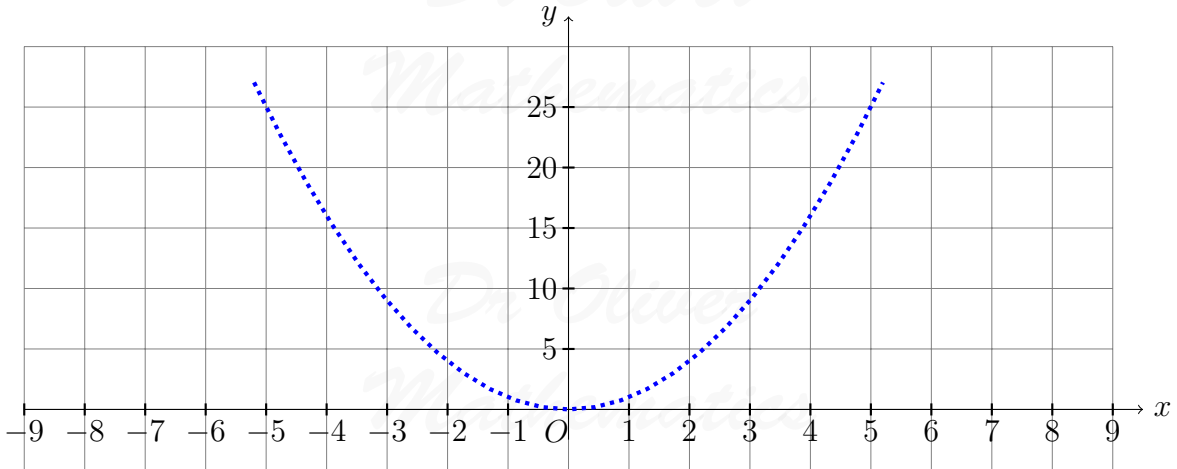
17. Show clearly that the equation of the line through  $B$  parallel to  $AC$  is (3)

$$2x + y = 2.$$



18. This graph is a sketch of

$$y = x^2.$$

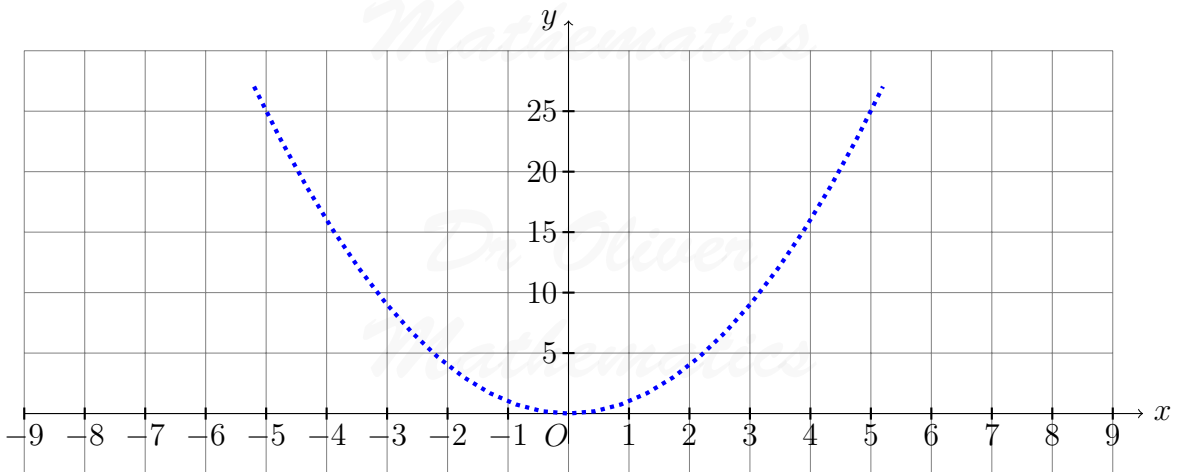


(a) Sketch the graph of

$$y = x^2 + 5$$

on the grid.

(1)



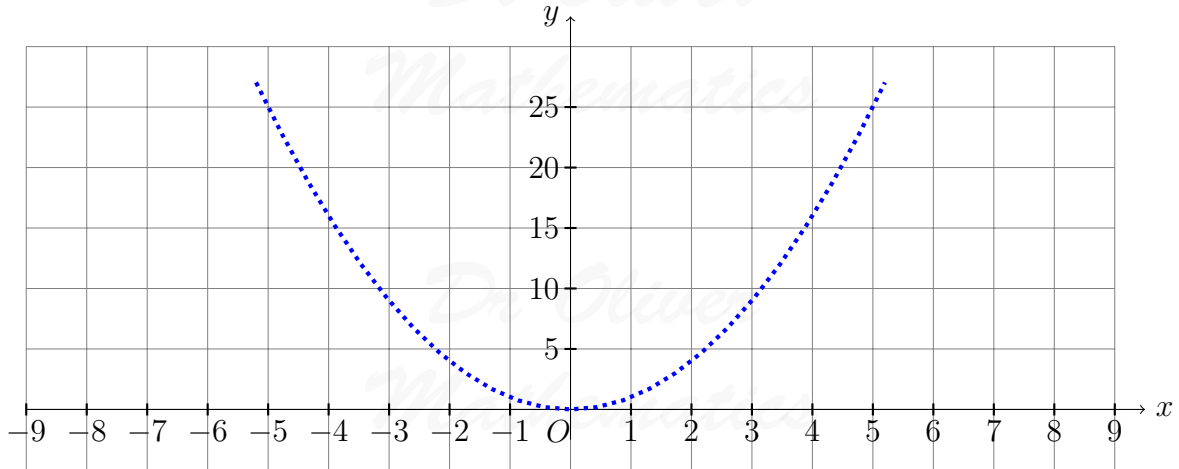
(b) Sketch the graph of

$$y = (x - 3)^2$$

on the grid.

(1)





19. Solve

$$x^2 + 8x + 6 = 0$$

(4)

by completing the square. Give your answer in the form  $a \pm \sqrt{b}$ , where  $a$  and  $b$  are integers.