Mock Grade 8/9

Maths Booklet 1

Paper 1H
Non-Calculator

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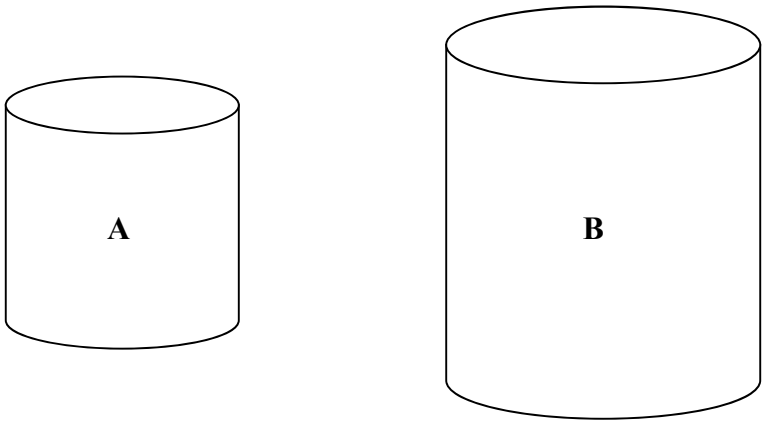
1 **A** and **B** are two similar cylindrical containers.



the surface area of container **A** : the surface area of container **B** = 18 : 98

Tyler fills container **A** with water.
She then pours all the water into container **B**.
Tyler repeats this and stops when container **B** is full of water.

Work out the number of times that Tyler fills container **A** with water.
You must show all your working.

.....

(Total for Question 1 is 4 marks)

2 There are 12 counters in a bag.

8 of the counters are green.
4 of the counters are blue.

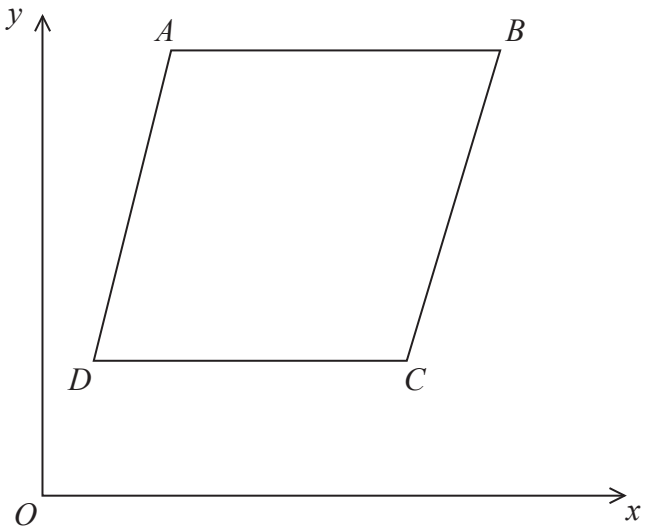
Ria takes at random two counters from the bag.

Work out the probability that Ria takes one counter of each colour.
You must show your working.

.....

(Total for Question 2 is 4 marks)

3



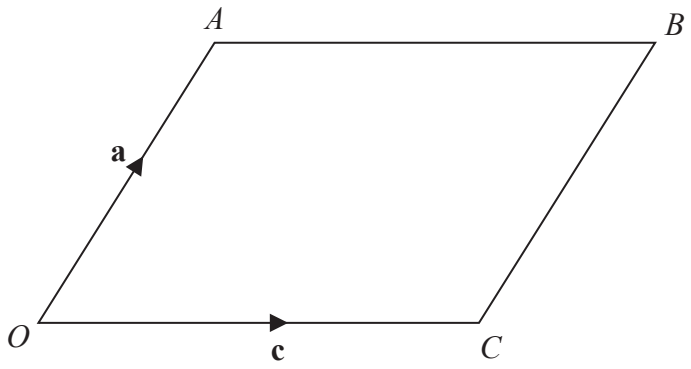
ABCD is a rhombus.
The coordinates of *A* are (9, 17)
The equation of the diagonal *DB* is $y = \frac{2}{3}x + 6$

Find an equation of the diagonal *AC*.

.....

(Total for Question 3 is 4 marks)

4



OABC is a parallelogram.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OC} = \mathbf{c}$

X is the midpoint of the line *AC*.
OCD is a straight line so that *OC* : *CD* = *k* : 1

Given that $\overrightarrow{XD} = 5\mathbf{c} - \frac{2}{3}\mathbf{a}$

find the value of *k*.

k = ...

(Total for Question 4 is 4 marks)

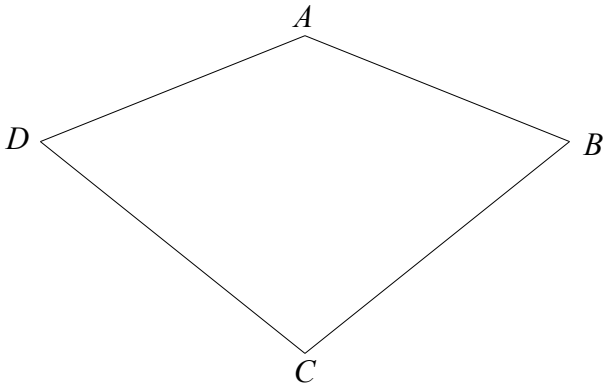
5 Solve algebraically the simultaneous equations

$$x^2 + y^2 = 41$$
$$y = 2x - 3$$

.....

(Total for Question 5 is 5 marks)

6 *ABCD* is a quadrilateral.

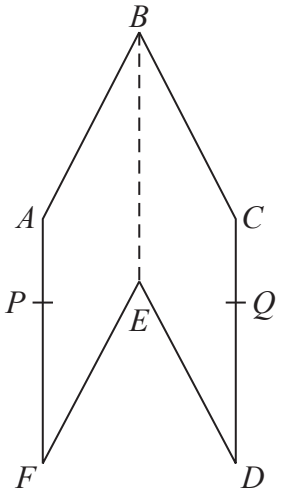


$AB = AD$
$BC = CD$

Prove that angle ABC is equal to angle ADC.

(Total for Question 6 is 4 marks)

7 The diagram shows a hexagon *ABCDEF*.



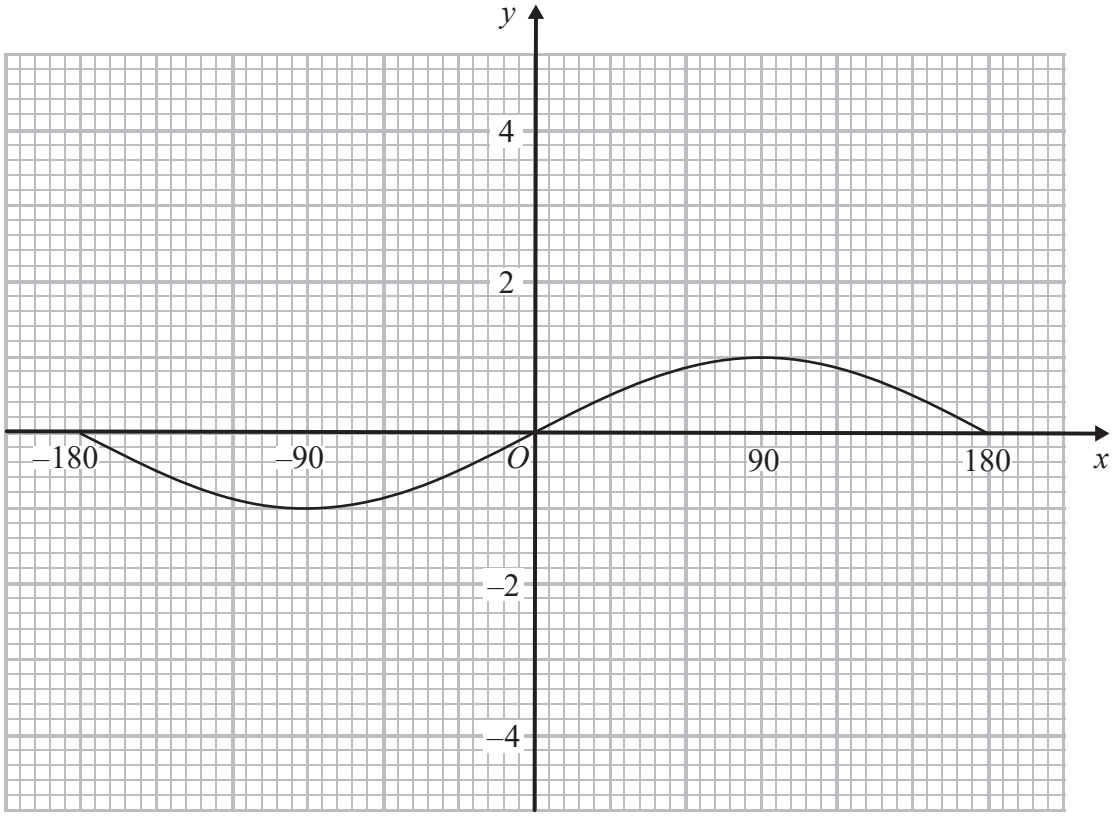
ABEF and *CBED* are congruent parallelograms where $AB = BC = 8$ cm.
P is the point on *AF* and *Q* is the point on *CD* such that $BP = BQ = x$ cm.

Given that angle $ABC = 30°$

prove that $\cos PBQ = 1 - \dfrac{32(2 - \sqrt{3})}{x^2}$

(Total for Question 7 is 5 marks)

8 Here is the graph of $y = \sin x°$ for $-180 \leqslant x \leqslant 180$



On the grid, sketch the graph of $y = 2\sin x° - 1$ for $-180 \leqslant x \leqslant 180$

(Total for Question 8 is 2 marks)

9 The point P has coordinates (5, 9)
The point Q has coordinates (a, b)

A line perpendicular to PQ is given by the equation $4x + 3y = 9$

Find an expression for b in terms of a.

.....

(Total for Question 9 is 5 marks)

10 n is an integer such that $1 < \frac{2n - 13}{3} < 5$ **and** $2 \leq \frac{35n}{n^2 + 66}$

Find all the possible values of n.

.....

(Total for Question 10 is 5 marks)