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## 0178/03

May/June 2023

**2 hours**

**Marks:100**

Additional Materials: Electronic Calculator  
Geometrical Instruments  
Tracing Paper (optional)

The number of marks is given in brackets [ ] at the end of each question or part question.

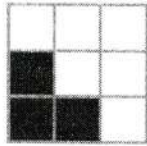
This document consists of **14** printed pages and **2** blank pages.



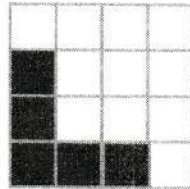
- 1 The diagrams show patterns with shaded and unshaded squares. The squares form a sequence.



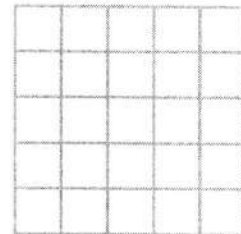
Pattern 1



Pattern 2



Pattern 3



Pattern 4

- (a) Complete pattern 4 to continue the pattern.

[1]

- (b) Write the number of shaded squares in pattern 7.

..... [1]

- (c) The total number of squares in pattern 45 is 2116.

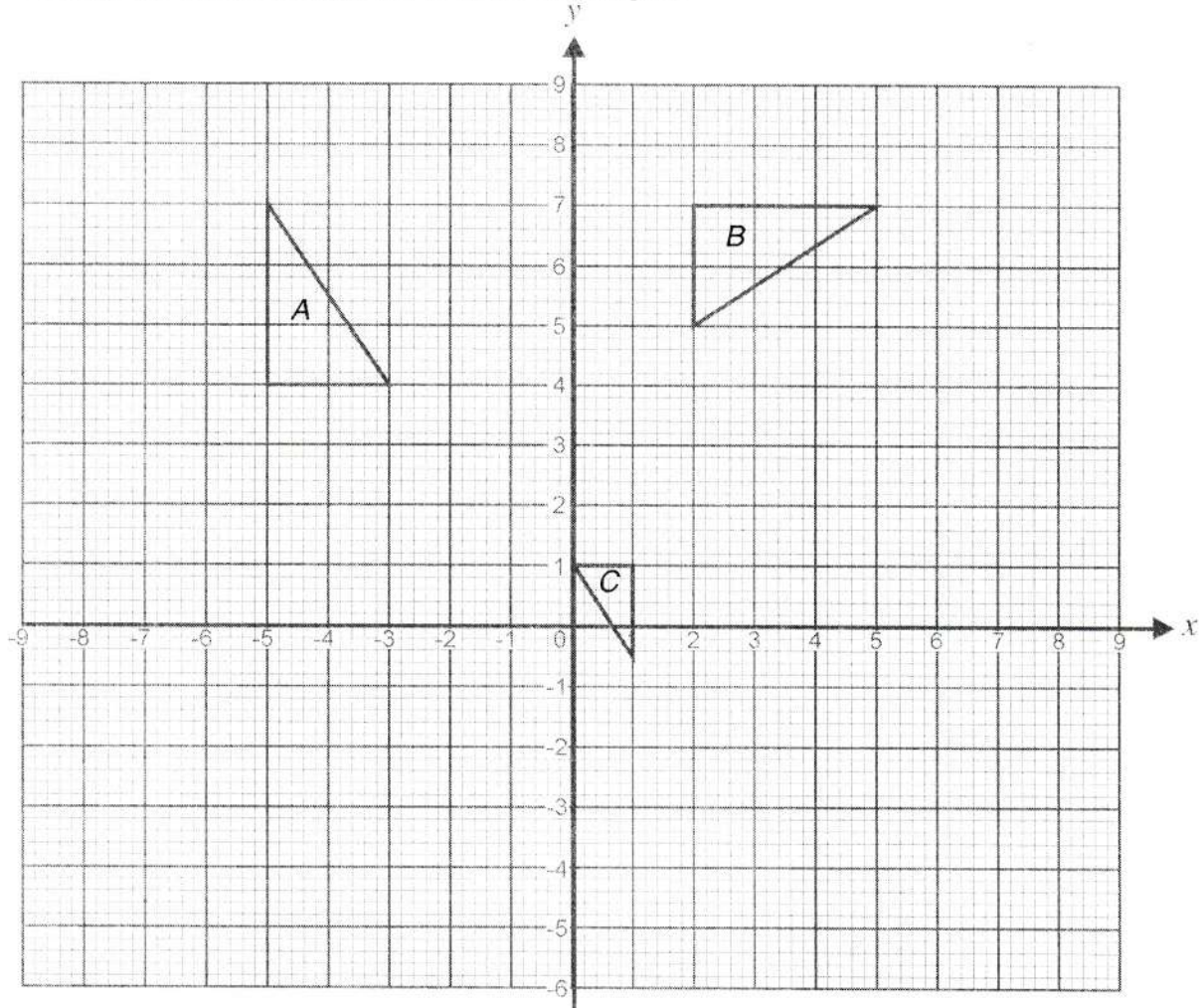
Find the number of unshaded squares in pattern 45.

..... [3]

- (d) Find an expression, in terms of  $n$ , for the number of unshaded squares in pattern  $n$ .

..... [3]

2 The diagram shows triangles *A*, *B* and *C* on the grid.



(a) Describe fully the single transformation that maps

(i) triangle *A* onto triangle *B*,

.....  
 ..... [3]

(ii) triangle *A* onto triangle *C*.

.....  
 ..... [3]

(b) On the grid,

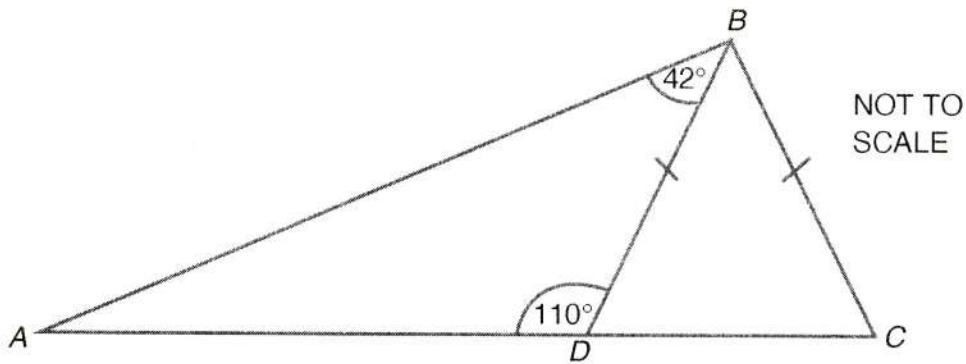
(i) reflect triangle *B* in the line  $y = 2$ , [2]

(ii) translate *B* by the vector  $\begin{pmatrix} -8 \\ -10 \end{pmatrix}$ . [2]

3 The diagram shows triangle  $ABC$ .

$BD$  is a straight line and  $D$  is a point on  $AC$ .

Angle  $ADB = 110^\circ$ , angle  $ABD = 42^\circ$  and  $BD = BC$ .



(a) What is the special name for the triangle  $BCD$ ?

..... [1]

(b) Find the size of angle

(i)  $BAD$ ,

.....  $^\circ$  [1]

(ii)  $ABC$ .

.....  $^\circ$  [2]

(c) It is given that  $BD = 7$  cm.

Calculate the shortest distance from point  $D$  to  $AB$ .

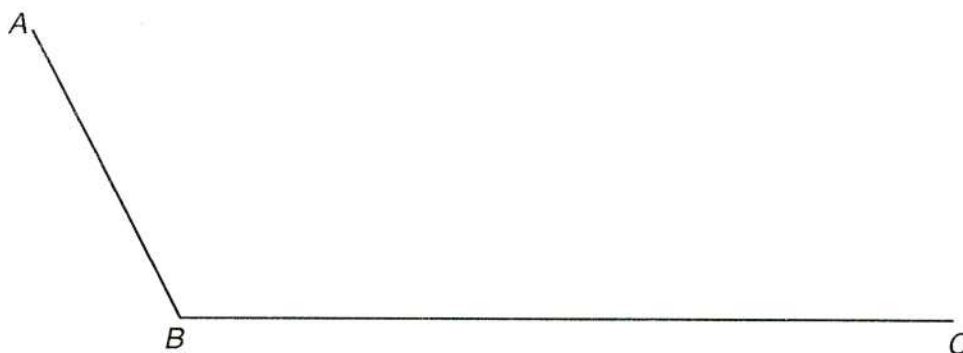
..... cm [2]

(d) The area of triangle  $ABD$  is  $38 \text{ cm}^2$ .

Calculate the length  $AB$ .

..... cm [2]

- 4 The diagram shows part of quadrilateral  $ABCD$ .



- (a) Measure and write the size of reflex angle  $ABC$ .

..... ° [2]

- (b) By construction, complete the quadrilateral  $ABCD$  such that  $AD = 6\text{ cm}$  and  $CD = 9\text{ cm}$ .

[2]

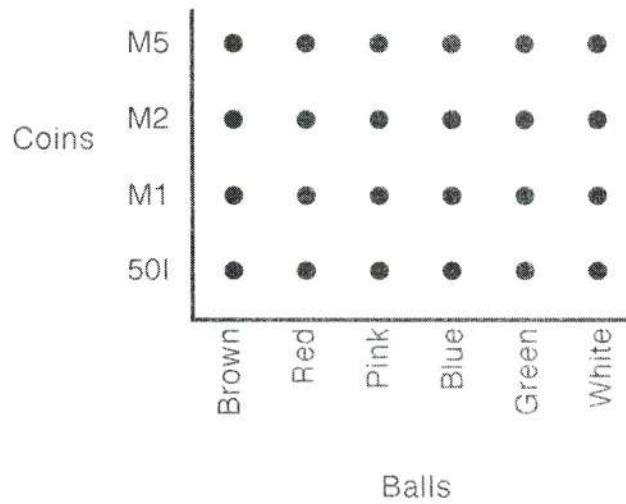
- (c) A region  $S$  inside  $ABCD$ , is

- closer to  $AB$  than  $BC$  and
- closer to  $B$  than  $A$ .

Construct and shade the possible region  $S$ .

[4]

- 5 (a) Six balls of different colours and four coins are placed in a bag. The possibility space diagram shows the possible outcomes when a ball and a coin are picked at random from the bag.



A ball and a coin are picked at random from the bag.

Find the probability that it is a

- (i) white ball and M1 coin,

..... [1]

- (ii) red ball and a coin worth at least M2.

..... [2]

- (b) The table shows the marks obtained by 25 students in a quiz that was marked out of 5.

|                    |   |   |   |   |   |   |
|--------------------|---|---|---|---|---|---|
| Marks              | 0 | 1 | 2 | 3 | 4 | 5 |
| Number of students | 1 | 2 | 6 | 8 | 5 | 3 |

- (i) Find the modal mark.

..... [1]

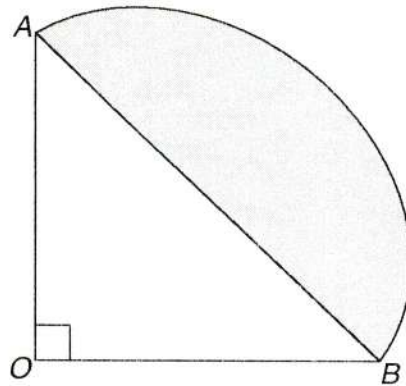
- (ii) Calculate the mean mark.

..... [3]

- (iii) Calculate the sector angle that would represent 2 marks if these data were to be presented in a pie chart.

.....° [2]

- 6 The diagram shows a sector  $AOB$ .  
Angle  $AOB$  is a right angle and  $O$  is the centre.



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- (a) The circumference of the circle from which the sector was cut is 13.2 cm.  
Show that the diameter of the circle from which the sector was cut is 4.2 cm correct to 1 decimal place.

- (b) Calculate

[2]

- (i) the length of chord  $AB$ ,

.....cm [3]

- (ii) the perimeter of the sector  $AOB$ ,

.....cm [2]

(iii) the area of the shaded part.

.....cm<sup>2</sup> [3]

---

7 (a)  $P = mv - mu$ .

Find the value of  $P$  when  $m = 3$ ,  $v = 5$  and  $u = -1$ .

(b) Express as a single fraction.

$$\frac{2x-1}{3} - \frac{3x+2}{5}$$

..... [2]

(c) Remove the brackets and simplify.

$$2(3x - 4y) - 3(x + 2y)$$

..... [3]

..... [2]

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8 (a) Solve  $x^2 - 9x + 14 = 0$ .

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

(b) Solve the simultaneous equations.

$$4y - 3x = 8$$

$$2y + x = 14$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$  [3]

9 Mohokare company renovates its park.

(a) The market value of the park increases from M370 000 to M382 580.

Calculate the percentage increase.

$\dots\dots\dots\%$  [3]

(b) Thandi works at the park for 9 hours per day.

She is paid M17.65 per hour.

Calculate her total payment for working 20 days.

M.  $\dots\dots\dots$  [2]

- (c) The entrance fee at the park is M9.50 per adult and M7.25 per child.

One day 22 adults and 32 children visited the park.

Calculate the total entrance fee received.

M..... [3]

- (d) On another day, 360 people visited the park.

These people were in the ratio

men : women : children  
3 : 2 : 7

Calculate the number of men who visited the park that day.

..... [2]

---

- 10** Pule rode a bicycle from home to school at a constant speed.  
The distance from home to school is 7.2 km.  
At 0700, he had travelled one-sixth of the total distance.  
At 0708, he had travelled half of the total distance.

**(a)** Find the fraction of the total distance Pule had travelled from 0700 to 0708.

..... [2]

**(b)** Calculate

**(i)** the distance Pule had travelled from 0700 to 0708,

..... km [2]

**(ii)** the speed, in kilometers per hour, at which Pule was cycling from 0700 to 0708.

..... km/h [3]

(c) If Pule left home at 0656, find the time at which he arrived at school.

..... [4]

- (d) One Saturday, Pule cycled from home to the shop at an average speed of 16 km/h for 30 minutes.  
He then cycled from the shop to Malingoaneng at an average speed of 16 km/h for 15 minutes.

Calculate the total distance travelled from home to Malingoaneng.

..... km [4]

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**11** A straight line passes through the points  $A(0,2)$ ,  $B(p,5)$  and  $C(8, q)$ .

**(a)** Given that  $B$  is the mid-point of  $AC$ , find the value of  $p$ .

$p = \dots\dots\dots$  [2]

**(b)** Find the equation of the line  $AB$ .

$\dots\dots\dots$  [2]

**(c)** The length of the line joining  $A$  and  $C$  is 10 units.

**(i)** Find the two possible values of  $q$ .

$q = \dots\dots\dots$  or  $q = \dots\dots\dots$  [4]

**(ii)** Explain why you would reject one of the solutions of  $q$ .

$\dots\dots\dots$   
 $\dots\dots\dots$  [1]

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