

CANDIDATE  
NAME

--

CENTRE  
NUMBER

--	--	--	--	--

CANDIDATE  
NUMBER

--	--	--	--

**MATHEMATICS**

**0980/22**

Paper 2 (Extended)

**May/June 2019**

**1 hour 30 minutes**

Candidates answer on the Question Paper.

Additional Materials:      Electronic calculator                      Geometrical instruments  
   Tracing paper (optional)

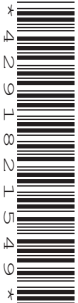
**READ THESE INSTRUCTIONS FIRST**

Write your centre number, candidate number and name on all the work you hand in.  
Write in dark blue or black pen.  
You may use an HB pencil for any diagrams or graphs.  
Do not use staples, paper clips, glue or correction fluid.  
**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.  
If working is needed for any question it must be shown below that question.  
Electronic calculators should be used.  
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.  
For  $\pi$ , use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.  
The number of marks is given in brackets [ ] at the end of each question or part question.  
The total of the marks for this paper is 70.

This document consists of **12** printed pages.



1 Write down a prime number between 50 and 60.

..... [1]

2 Use your calculator to work out  $\sqrt{1 - (\sin 33^\circ)^2}$ .

..... [1]

3 Write the recurring decimal  $0.\dot{7}$  as a fraction.

..... [1]

4 Complete each statement.

(a) A quadrilateral with only one pair of parallel sides is called a ..... [1]

(b) An angle greater than  $90^\circ$  but less than  $180^\circ$  is called ..... [1]

5 The distance between Prague and Vienna is 254 kilometres.  
The local time in Prague is the same as the local time in Vienna.  
A train leaves Prague at 15 20 and arrives in Vienna at 19 50 the same day.

Calculate the average speed of the train.

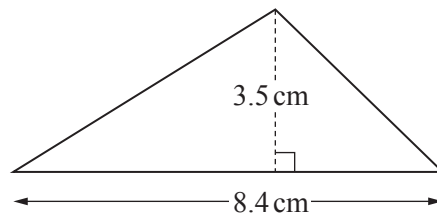
..... km/h [2]

6 Solve the equation.

$$9f + 11 = 3f + 23$$

$f =$  ..... [2]

7



NOT TO  
SCALE

Calculate the area of this triangle.

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

8 (a) Write 0.047 883 correct to 2 significant figures.

..... [1]

(b) Write 0.005 27 in standard form.

..... [1]

9 Find the highest common factor (HCF) of 90 and 48.

..... [2]

10 On a map with scale 1 : 25 000, the area of a lake is 33.6 square centimetres.

Calculate the actual area of the lake, giving your answer in square kilometres.

..... km<sup>2</sup> [2]

11 Find the matrix that represents a rotation about  $(0, 0)$  through  $90^\circ$  clockwise.

$$\left( \begin{array}{cc} & \\ & \end{array} \right) \quad [2]$$

12 Simplify.

(a)  $5m^2 \times 2m^3$

..... [2]

(b)  $(x^8)^3$

..... [1]

13 Without using a calculator, work out  $2\frac{1}{4} \div \frac{3}{7}$ .

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

- 14 Solve the simultaneous equations.  
You must show all your working.

$$5x + 8y = 4$$

$$\frac{1}{2}x + 3y = 7$$

$x = \dots\dots\dots$

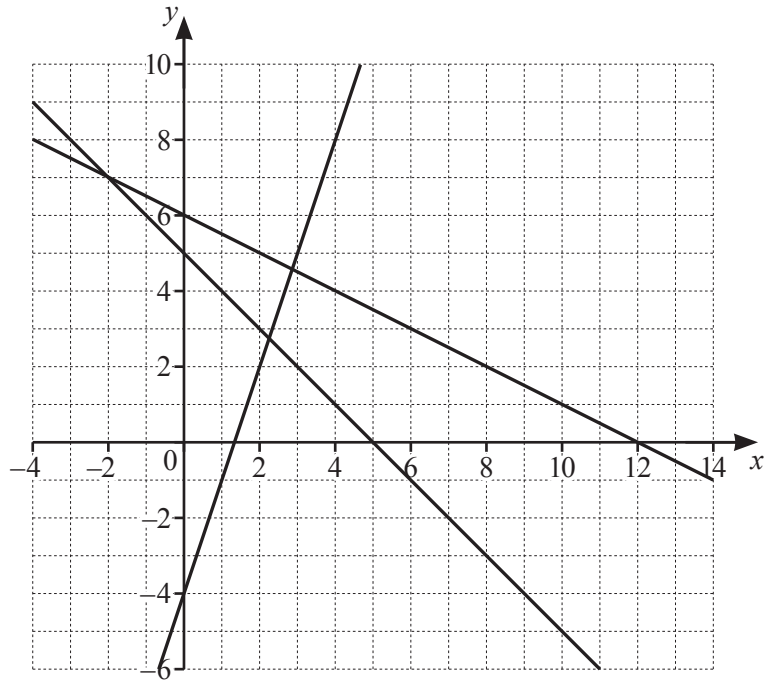
$y = \dots\dots\dots [3]$

- 15 Shona buys a chair in a sale for \$435.60 .  
This is a reduction of 12% on the original price.

Calculate the original price of the chair.

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

16



$$y \leq -\frac{1}{2}x + 6 \quad y \geq 3x - 4 \quad x + y \geq 5$$

- (a) By shading the **unwanted** regions of the grid, find and label the region  $R$  that satisfies the three inequalities. [2]
- (b) Find the largest value of  $x + y$  in the region  $R$ , where  $x$  and  $y$  are integers.

..... [1]

17 Write as a single fraction in its simplest form.

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

..... [3]

- 18 The table shows the number of people in different age groups at a cinema.

Age ( $y$ years)	$15 < y \leq 25$	$25 < y \leq 30$	$30 < y \leq 50$	$50 < y \leq 80$
Number of people	35	32	44	12

Dexter draws a histogram to show this information.

The height of the bar he draws for the group  $15 < y \leq 25$  is 7 cm.

Calculate the height of each of the remaining bars.

$25 < y \leq 30$  ..... cm

$30 < y \leq 50$  ..... cm

$50 < y \leq 80$  ..... cm [3]

19 Rearrange this formula to make  $m$  the subject.

$$P = \sqrt{\frac{k+m}{m}}$$

$$m = \dots\dots\dots [4]$$

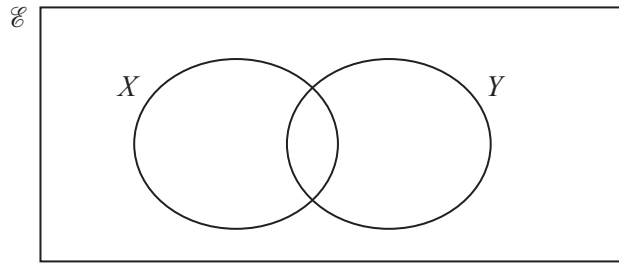
20 Solve the equation  $3x^2 - 2x - 10 = 0$ .

Show all your working and give your answers correct to 2 decimal places.

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots [4]$$

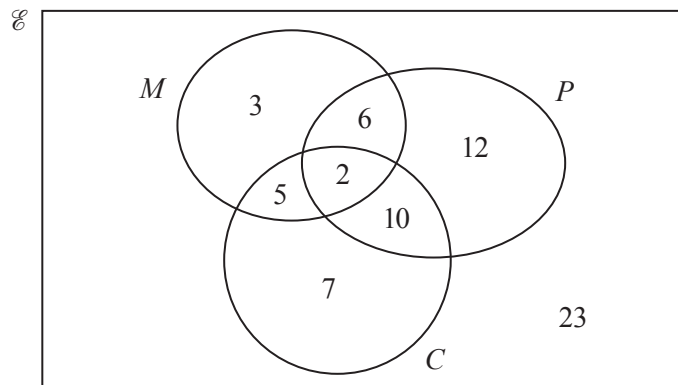


21 (a) In the Venn diagram, shade  $X \cup Y'$ .



[1]

(b) The Venn diagram below shows information about the number of gardeners who grow melons ( $M$ ), potatoes ( $P$ ) and carrots ( $C$ ).



(i) A gardener is chosen at random from the gardeners who grow melons or potatoes or both.  
Find the probability that this gardener does not grow carrots.

..... [2]

(ii) Find  $n((M \cap P) \cup C')$ .

..... [1]

22       $\mathbf{A} = \begin{pmatrix} 3 & 4 \\ 0 & 1 \end{pmatrix}$        $\mathbf{B} = \begin{pmatrix} 3 & -4 \end{pmatrix}$

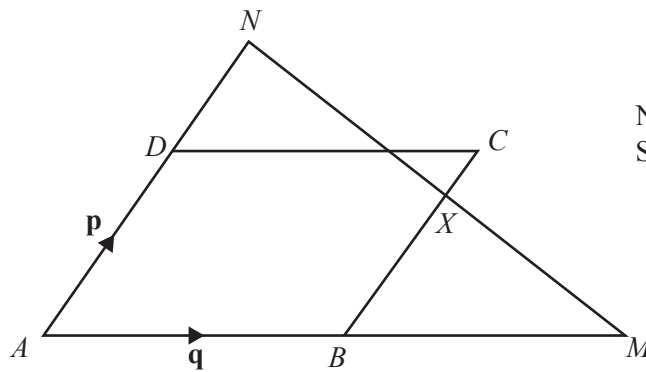
(a) Find  $\mathbf{A}^{-1}$ , the inverse of  $\mathbf{A}$ .

..... [2]

(b) Calculate  $\mathbf{BA}$ .

..... [2]

23



NOT TO SCALE

$ABCD$  is a parallelogram with  $\overrightarrow{AB} = \mathbf{q}$  and  $\overrightarrow{AD} = \mathbf{p}$ .  
 $ABM$  is a straight line with  $AB : BM = 1 : 1$ .  
 $ADN$  is a straight line with  $AD : DN = 3 : 2$ .

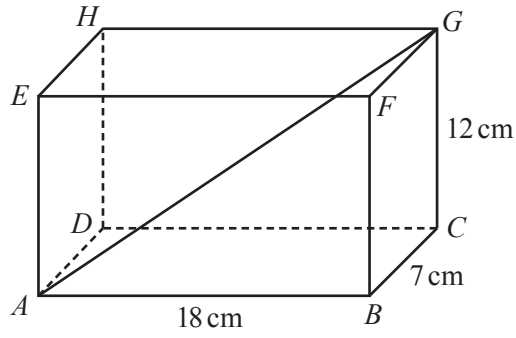
(a) Write  $\overrightarrow{MN}$ , in terms of  $\mathbf{p}$  and  $\mathbf{q}$ , in its simplest form.

$\overrightarrow{MN} = \dots\dots\dots$  [2]

(b) The straight line  $NM$  cuts  $BC$  at  $X$ .  
 $X$  is the midpoint of  $MN$ .  
 $\overrightarrow{BX} = k\mathbf{p}$

Find the value of  $k$ .

$k = \dots\dots\dots$  [2]



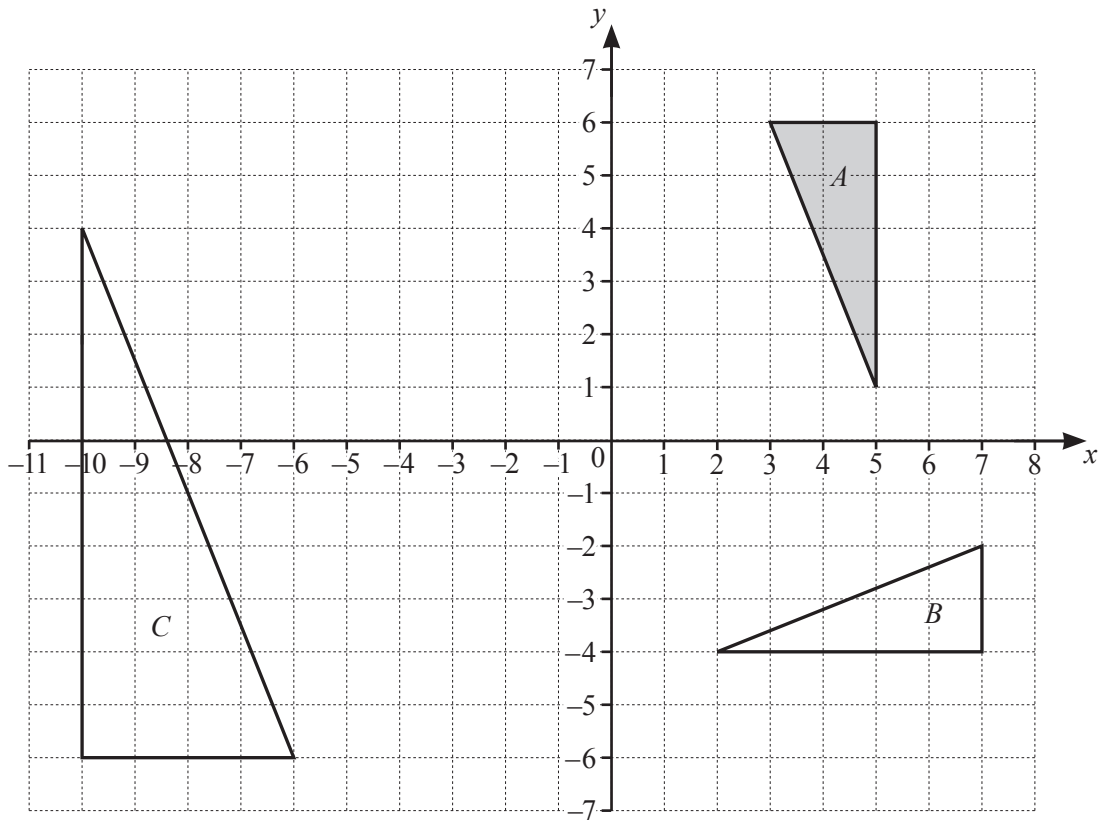
NOT TO  
SCALE

$ABCDEFGH$  is a cuboid.  
 $AB = 18$  cm,  $BC = 7$  cm and  $CG = 12$  cm.

Calculate the angle that the diagonal  $AG$  makes with the face  $BCGF$ .

..... [4]

**Question 25 is printed on the next page.**



Describe fully the **single** transformation that maps

- (a) triangle *A* onto triangle *B*,

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

- (b) triangle *A* onto triangle *C*.

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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at [www.cambridgeinternational.org](http://www.cambridgeinternational.org) after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.