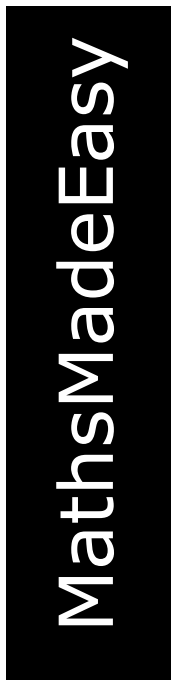


First Name	
Last Name	
Date	
Total Marks	/ 100 marks



GCSE Mathematics
Non-Calculator
Higher Tier
Mock 2, paper 1
1 hour 45 minutes



Instructions

Write your name and other details in the boxes above.
Answer all the questions
Take π to be 3.142

Information

Marks are shown in brackets for each question (2)
Calculators may NOT be used

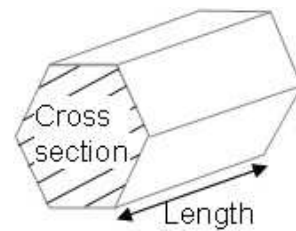
Advice

Don't spend too long on one question
Show all your working in calculations for full marks
You will get marks for method even if your answer is incorrect
Leave a question until later if you cannot answer it

Materials needed for examination
Ruler marked in centimetres and millimetres,
protractor, compasses, pen, pencil, rubber
Tracing paper may be used

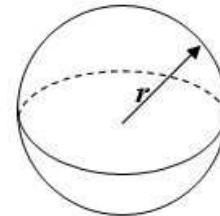
Formulae sheet — Higher tier

Volume of prism = area of cross-section \times length



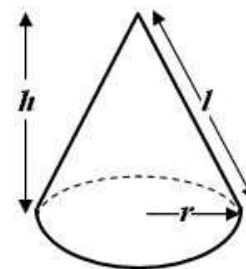
Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$

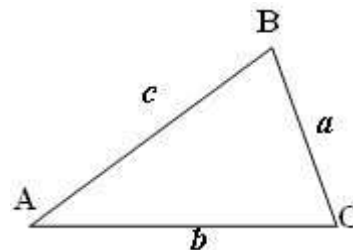


In any triangle ABC

Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of a triangle = $\frac{1}{2} ab \sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Authors Note

Every possible effort has been made to ensure that everything in this paper is accurate and the author cannot accept responsibility for any errors.

Apart from any fair dealing for the purposes of research or private study as permitted under the Copyright, Designs and Patents Act 1988, this paper may only be reproduced, stored or transmitted in any form or by any means with the prior permission in writing of the author, or in the case of reprographic reproduction in accordance with the terms and licence by the CLA. Enquiries concerning reproduction outside these terms should be sent to the author.

The right of David Weeks to be identified as the author of this work has been asserted by him in accordance with the Copyright, Designs and Patents Act 1988.

1. a) Work out $3\frac{2}{3} \div 1\frac{1}{2}$

.....

(2)

b) Work out $3\frac{2}{3} \times 2\frac{1}{4}$

Give your answer in its simplest form

.....

(2)

2. a) Expand $y(y^3 - 3y)$

(2)

.....

b) Expand and simplify $(2x - 1)(3 - x)$

(2)

.....

c) $-3 \leq y < 2$
Write down the integer values of y

(1)

.....

d) Solve $5 - 7a = 3(a - 1)$

(2)

a =

e) Factorise $7y + 21$

(1)

.....

d) Simplify $\frac{9 - b^2}{3 - b}$

(2)

.....

3. Work out

a) 0.2×0.4

(1)

.....

b) $50 \div 0.2$

(1)

.....

c) Estimate $\frac{4.9 \times 29.7}{15.1}$

(1)

d) $4 - 2 \div \frac{1}{2} + 1$

(1)

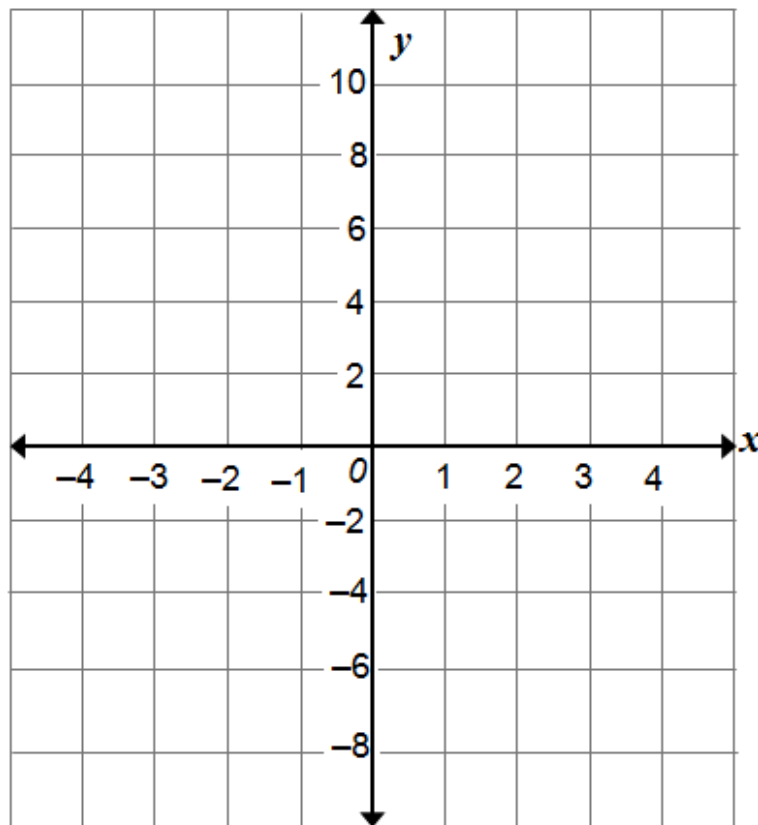
4. Complete this table of values for $3x = -y + 2$

(2)

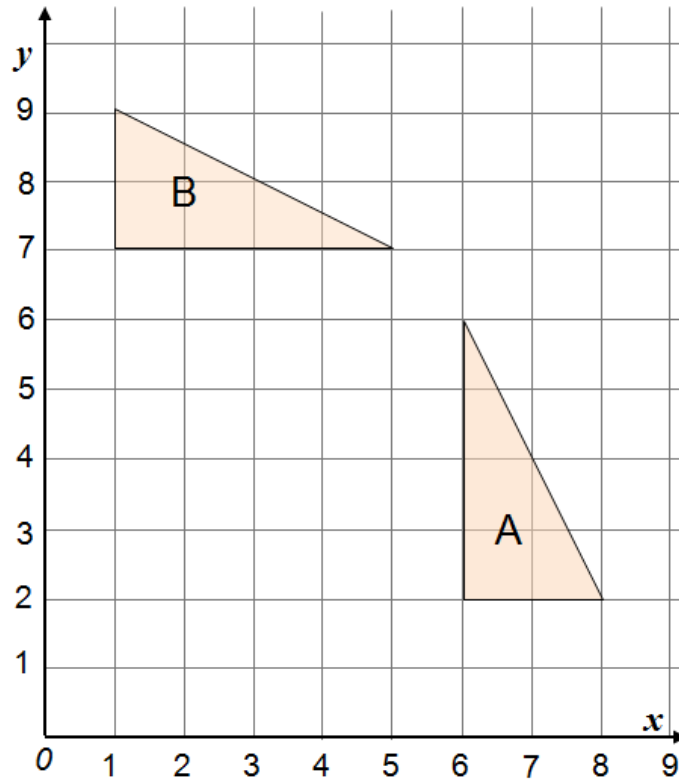
x	-3	-2	-1	0	1	2
y	11		5		-1	

On the grid draw the graph of $3x = -y + 2$

(2)



5a)

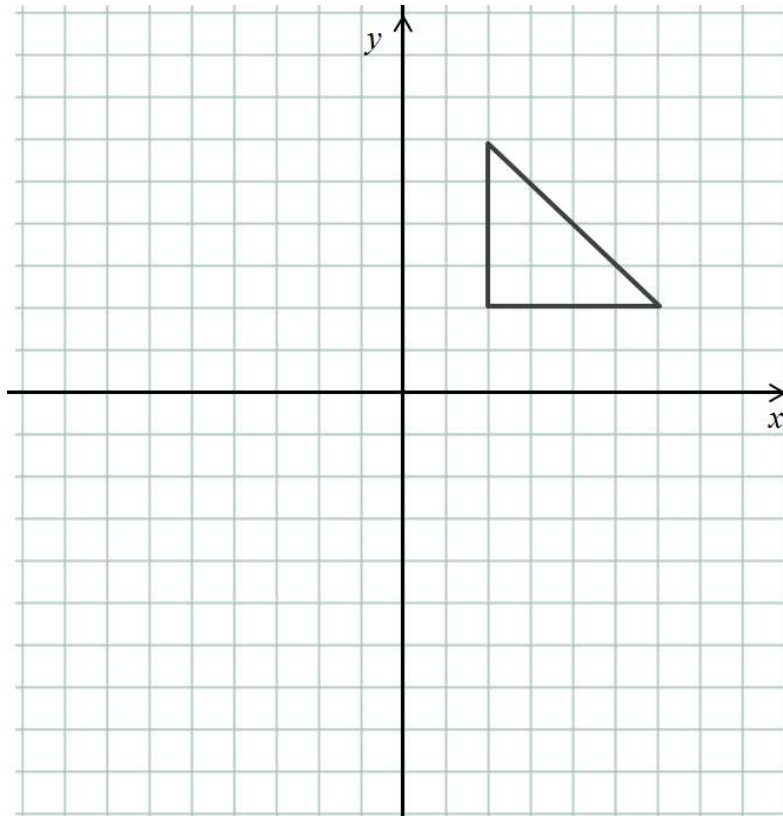


Triangle A and triangle B have been drawn on the grid
Describe the single transformation which maps triangle A to B

.....

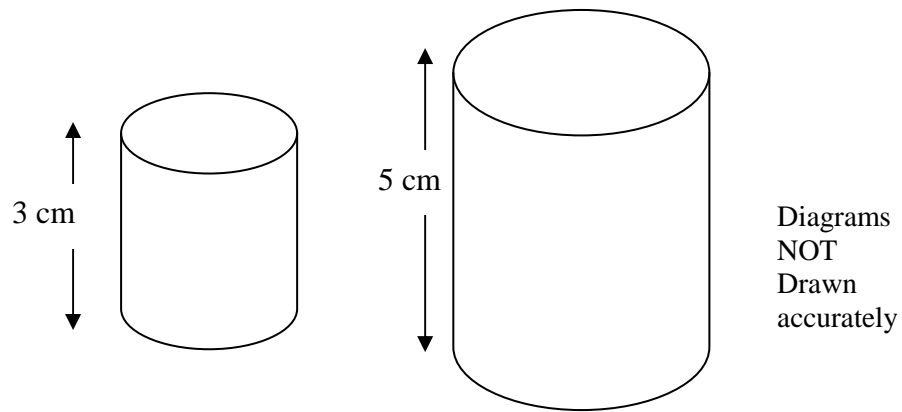
(2)

5b). Enlarge triangle A by scale factor of $-\frac{1}{2}$, centre O .



(3)

6. Two mathematically similar cylinders are shown



The volume of the smaller cylinder is 54 cm^3
Calculate the volume of the larger cylinder.

..... cm^3 (3)

7. Cyril had a 6 sided dice and a spinner marked with the numbers 1 to 5.
He threw the dice and spun the spinner once and added up the two scores to get a total.
What is the probability of getting a total score of 8 or more.

..... (2)

Now Cyril threw the dice and spun the spinner 90 times.
Work out an estimate for the number of times he gets a total score of exactly 8.

..... (2)

8. A school had 200 pupils in Year 11.
Each pupil needed a copy of a Maths, English and Science text book.

Book	In stock now	Cost per book
Maths	140	£1.25
English	80	£2
Science	200	£3

A 25% discount was given for any book where more than 100 copies were ordered.

What was the total cost of the book order the school needed to make.

..... (4)

9. Sylvia made some bricklaying mortar using these proportions:

- 1 part cement
- $\frac{1}{4}$ part lime
- 3 parts sand

She made 8.5 kg of mortar.
Work out the proportions for each

Cement kg
Lime kg
Sand kg

(3)

10.

The table shows some expressions.
 a , b , c and d represent lengths.
 π and 3 are numbers which have no dimensions

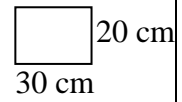
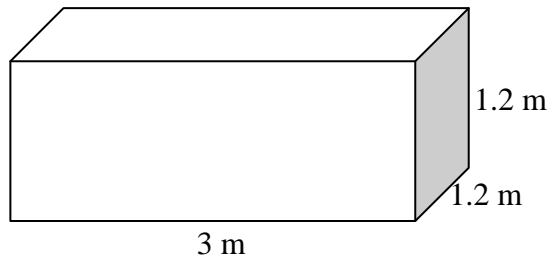
$3a$	πab^2	πab	$ac + b^2d$	$3(a^2 + b^2)$	$3(c+d)^3$	$\frac{2abcd}{5ac}$

Tick (✓) the boxes underneath the **three** expressions which could represent areas.

(3)

11. Jess wants to cover a cuboid with some tiles

Diagram NOT
drawn accurately



The cuboid is 3 m wide and 1.2 m high and 1.2 m deep.
The tiles are 20cm high and 30 cm long

Tiles come in boxes of 25.
How many boxes of tiles will she need.

..... (4)

She wants to paint the front face of the cuboid (3m by 1.2 m)
A tin of paint covers 3600 cm^2
How many tins will she need

..... (1)

12. Two cars drove around a 10 mile circuit.
 They started together.
 Car A took 8 minutes for each circuit and Car B took 15 minutes.

How many miles did each car travel before they passed the start line together again.

Car Amiles (4)
 Car Bmiles

13. a) Find the value of

i) 7^0

ii) $49^{1/2}$

iii) $125^{-2/3}$

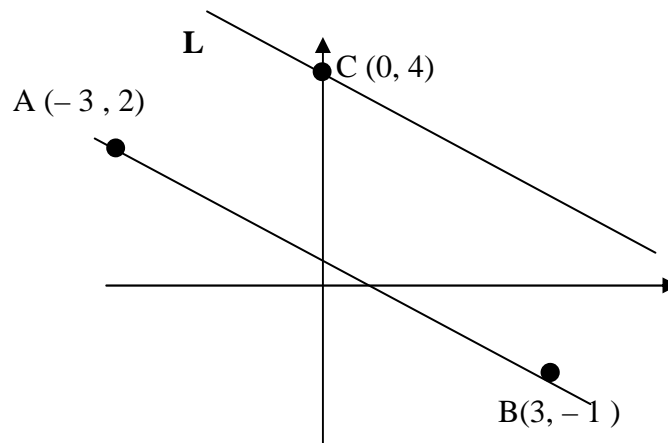
b) $4 \times \sqrt{64} = 4^n$ (4)

Find the value of n

$n =$ (2)

14.

Diagram NOT
drawn accurately



The diagram shows three points $A(-3, 2)$, $B(3, -1)$ and $C(0, 4)$
The Line L is parallel to AB and passes through C

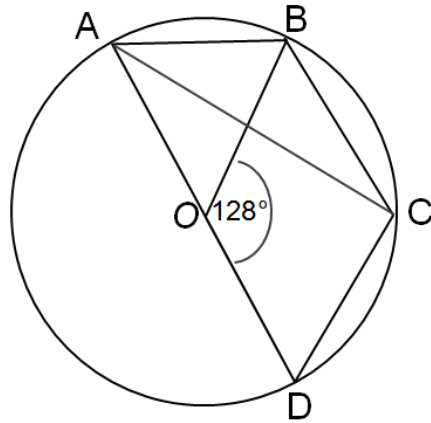
Find the equation of the line L

..... (4)

15. Prove that $0.\dot{2}\dot{7}\dot{9} = \frac{11}{37}$

(3)

16.



In the diagram, A,B,C and D are points on the circumference of a circle with centre O.

Angle BOD = 128° .

(a) (i) Work out the size of angle OAB.

.....^o

(ii) Give a reason for your answer.

.....

.....

(b) Work out the size of angle BCA.

(2)

.....^o

(3)

17. Given that $x^2 - 10x - 7 = (x - a)^2 - b$ find a and b

a = b = (3)

Hence solve $x^2 - 10x - 7 = 0$

Give your answer in the form $c \pm d\sqrt{2}$

x = (3)

18. Rationalise the denominator of $\frac{1}{8\sqrt{8}}$

Give your answer in the form $\frac{\sqrt{2}}{m}$ where m is a positive integer

..... (2)

18. The resistance R of a wire is inversely proportional to the cross sectional area A of the wire.

When $A = 0.2$, $R = 270$

a) Find R when $A = 0.5$

$R = \dots\dots\dots$ (3)

19. ACDEF is a trapezium with DE parallel to CF

$$\overrightarrow{CD} = 3\mathbf{b}, \overrightarrow{DE} = 3\mathbf{a} \text{ and } \overrightarrow{CF} = 7\mathbf{a}$$

P is the midpoint of DE and Q is the midpoint of CF

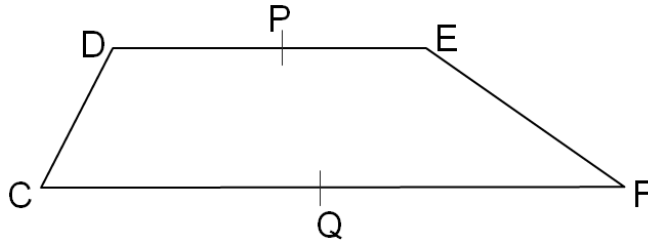


Diagram NOT drawn accurately

a) Find the vector \overrightarrow{PQ} in terms of a and b

\overrightarrow{PQ} (2)

R is the midpoint of PQ and S is the midpoint of EF

b) Prove that CF and RS are parallel

(2)

20. A survey of 100 pupil showed how long they spent revising in the month before their maths exams.

The table below shows how long in hours the pupils spent.

Time (t hours)	Frequency
$0 \leq t < 4$	5
$4 \leq t < 8$	17
$8 \leq t < 12$	47
$12 \leq t < 16$	25
$16 \leq t < 20$	6

- a) Complete the cumulative frequency table

(1)

Time (t hours)	Cumulative Frequency
$0 \leq t < 4$	
$0 \leq t < 8$	
$0 \leq t < 12$	
$0 \leq t < 16$	
$0 \leq t < 20$	

- b) Using your completed table draw a cumulative frequency graph on the grid

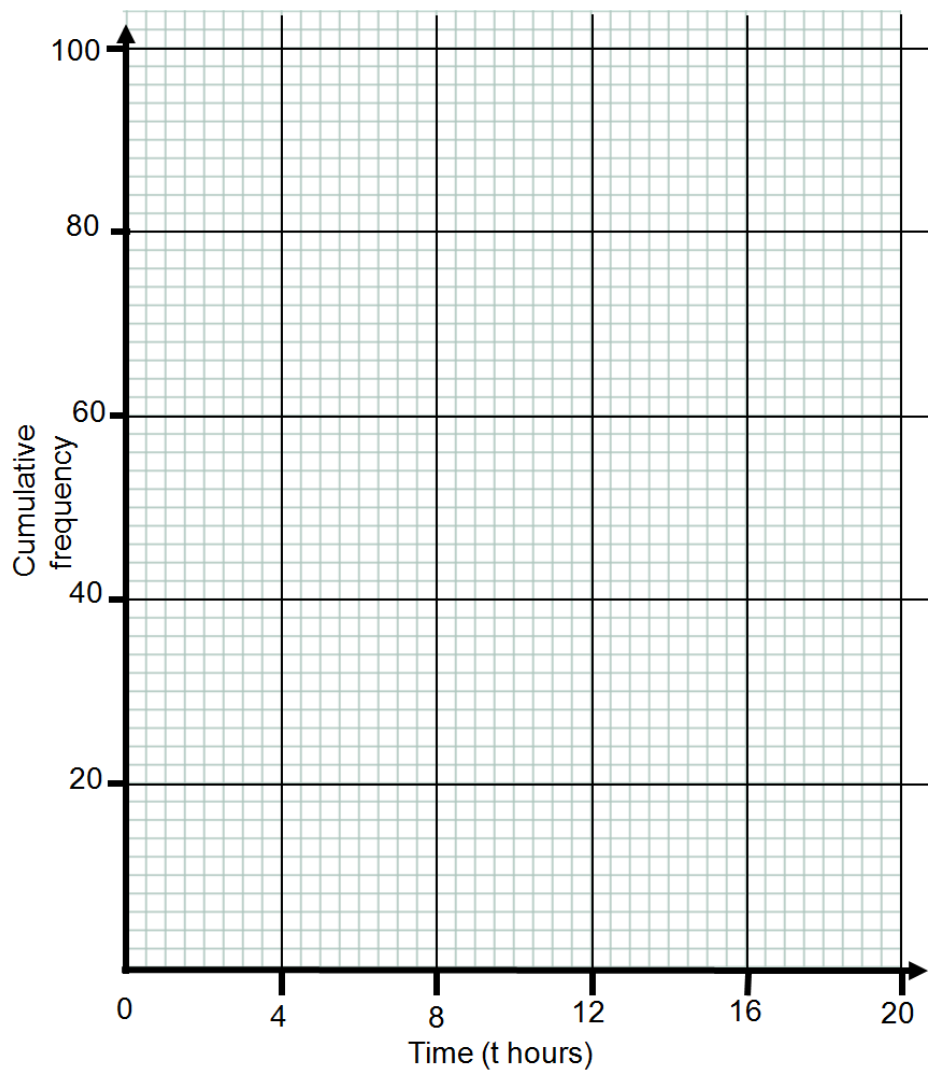
(2)

- c) Using the cumulative frequency graph to estimate how many pupils spent 11 or more hours revising in a month.

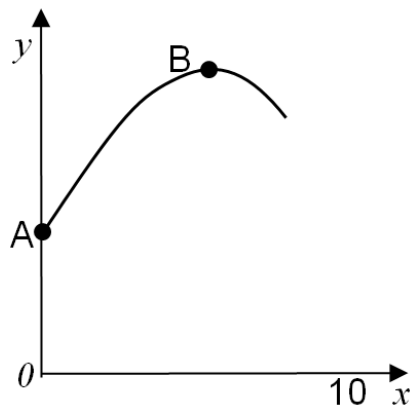
..... (1)

- d) Work out the inter-quartile range

..... (1)



21. The diagram shows a sketch of the graph $y = 16 - \frac{(x-6)^2}{4}$ for $0 \leq x \leq 10$



A and B are points on the graph
 A is the point where the graph meets the y axis
 B is the point at which y has its maximum value.

a) What are the co-ordinates of

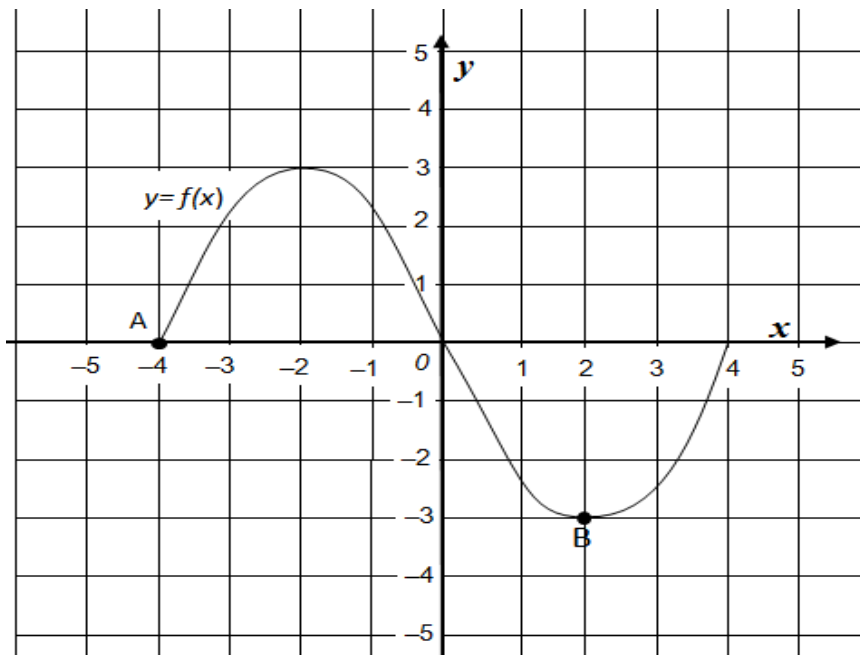
i) A (.....,) (2)

ii) B (.....,) (2)

b) Show that $16 - \frac{(x-6)^2}{4} = \frac{(2+x)(14-x)}{4}$

(3)

22. The diagram shows a sketch of $y = f(x)$.

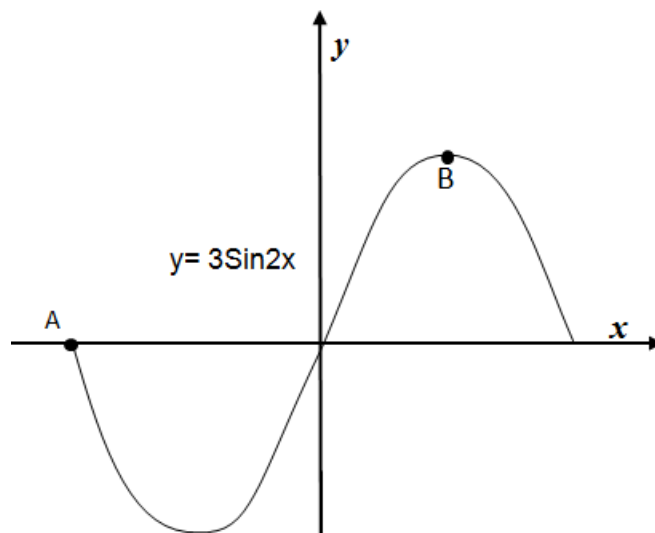


- a) Sketch the graph of $y = -f(x-1)$ on the grid showing the co-ordinates of points A and B.

A (.....,

B (.....,) (2)

The diagram shows part of the graph of $y = 3\sin 2x^\circ$



Write down the co-ordinates of A and B

A (.....,

B (.....,) (2)