

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE METHODS IN MATHEMATICS (LINKED PAIR)

H

Higher Tier Unit 1 Algebra and Probability (Section A)

Wednesday 2 November 2016

Morning

Time allowed: 45 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- This paper is divided into two sections: Section A and Section B.
- After the 45 minutes allowed for Section A, you must put your calculator on the floor under your seat. You will then be given Section B.
- When you have answered Section B you may work again on Section A but you must **not** use a calculator. It must remain on the floor under your seat.
- At the end of the examination tag Section A and Section B together with Section A on top.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 40
- The quality of your written communication is specifically assessed in Questions 2 and 4. These questions are indicated with an asterisk (*).
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.
- You are expected to use a calculator where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.

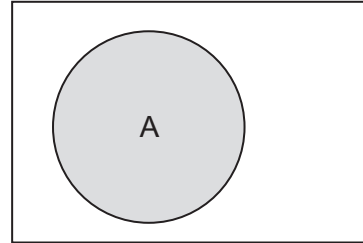
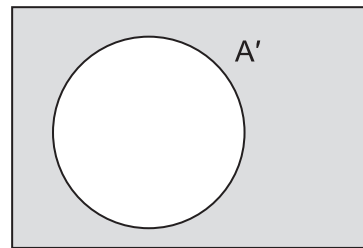
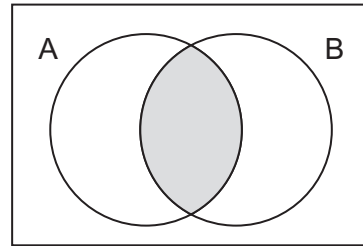
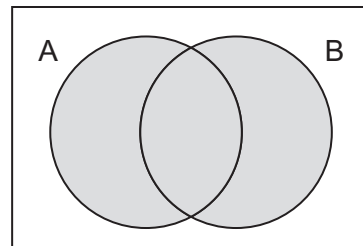


N 0 V 1 6 9 3 6 5 1 H A 0 1

Formulae Sheet: Higher Tier

Set notation

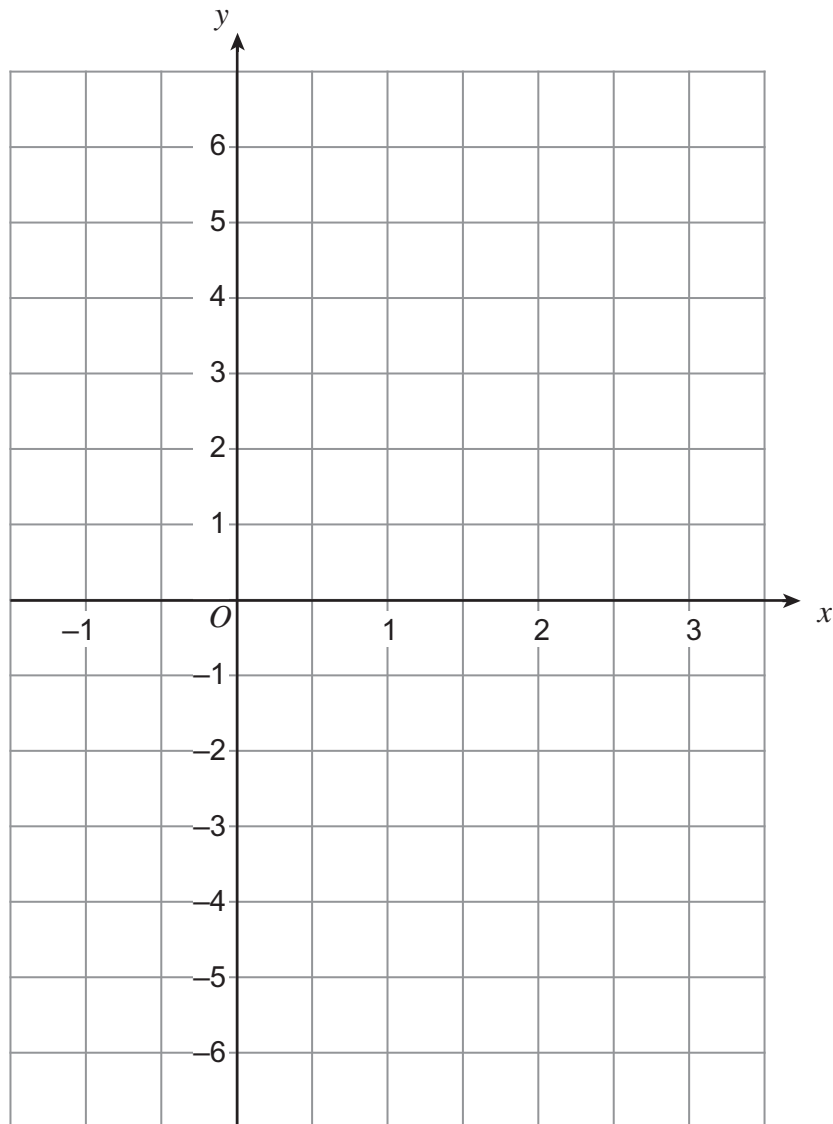
A

 A'  $A \cap B$  $A \cup B$ 

Answer **all** questions in the spaces provided.

1 Draw the graph of $y = 2x - 3$ for values of x from -1 to 3

[3 marks]



*2

A bottle contains 300 beads.
75 of the beads are red.
All the other beads are blue.

The number of red beads is **increased** by $\frac{2}{3}$

The number of blue beads is **decreased** by 20%

Has the total number of beads in the bottle increased?
You **must** show your working.

[4 marks]



3 Solve $10x - 7 = 4x + 2$

[3 marks]

$x =$ _____

*4 $T = 5n + 3p$

n is an integer.

p is 1 more than n .

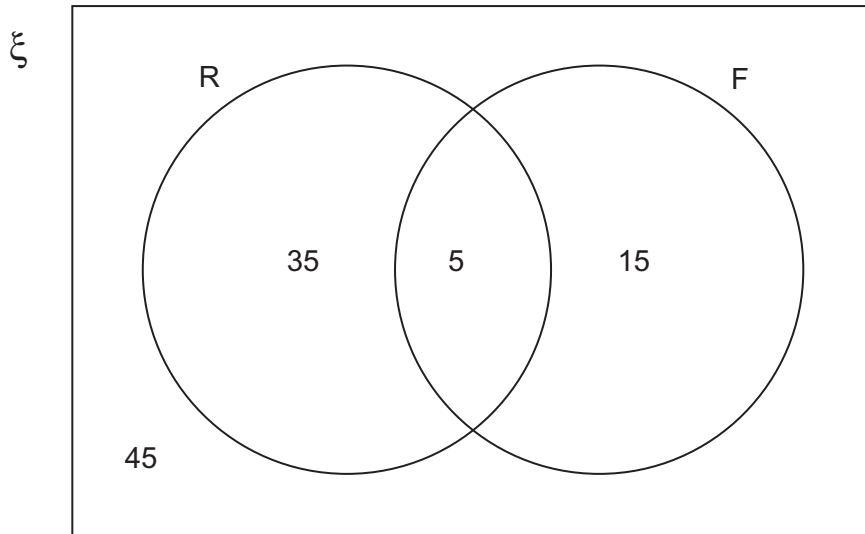
Show that T is always an odd number.

[3 marks]



5 The Venn diagram shows information about the 100 passengers on a flight.

R is the set of passengers with a return ticket.
F is the set of passengers in first class.



One passenger is chosen at random.

5 (a) Circle the value of $P(R')$

[1 mark]

0.15

0.45

0.6

0.65

5 (b) Show that $P(R \cup F) < P(R) + P(F)$

[2 marks]



6 Rearrange $5x = \frac{3y - 20x}{x - 4}$ to make y the subject.

Give your answer in its simplest form.

[3 marks]

Answer _____

7 Three numbers are in the ratio 12 : 13 : 15

The difference between the largest number and the smallest number is 72

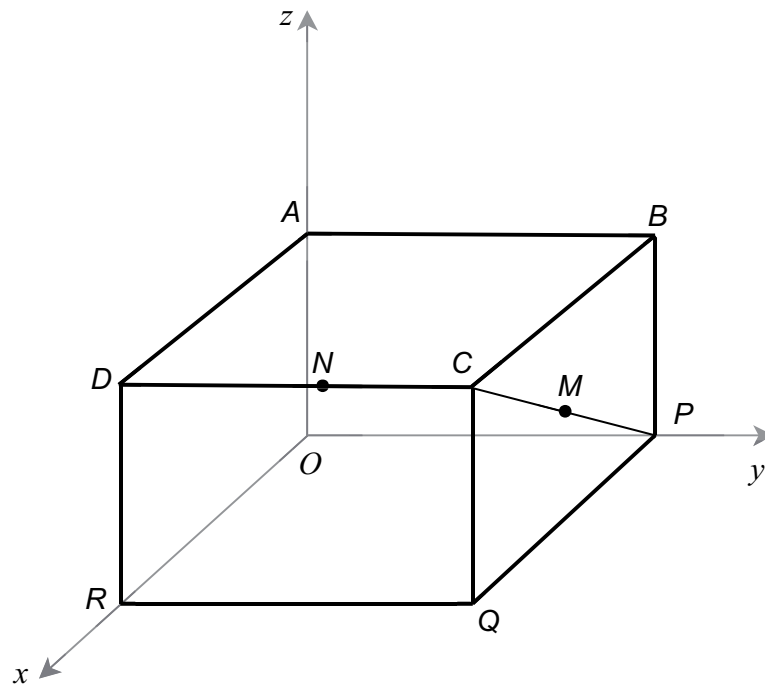
Work out the middle number.

[2 marks]

Answer _____



- 8 The diagram shows a cuboid drawn on a 3D coordinate grid.



M is the midpoint of CP .
The coordinates of M are $(4, 10, 1.5)$

N is the midpoint of DC .

Work out the coordinates of N .

[3 marks]

Answer (_____ , _____ , _____)



9 A biased coin has

$$P(\text{heads}) = \frac{3}{10} \quad \text{and} \quad P(\text{tails}) = \frac{7}{10}$$

The coin is tossed.

If the coin shows heads a counter is picked at random from Bag A.
Bag A contains 2 green counters and 3 white counters.

If the coin shows tails a counter is picked at random from Bag B.
Bag B contains 1 green counter and 4 white counters.

Work out the probability of a green counter being picked.

[4 marks]

Answer _____

7

Turn over ►



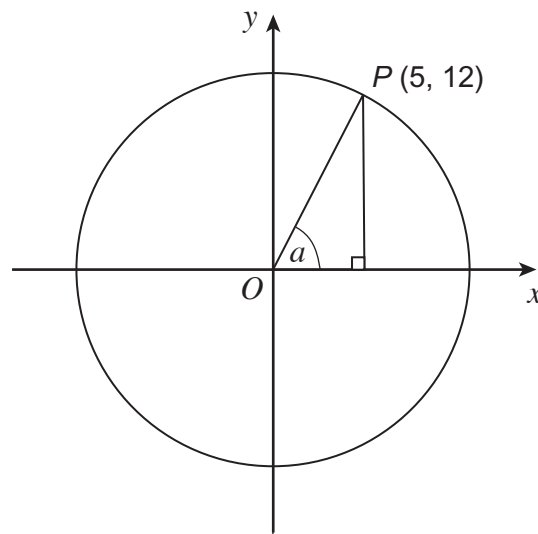
10 A circle has centre $(0, 0)$ and radius 13

10 (a) Write down the equation of the circle.

[1 mark]

Answer _____

10 (b) P is a point on the circle.



Not drawn accurately

Circle the value of $\cos a$.

[1 mark]

$$\frac{5}{12}$$

$$\frac{5}{13}$$

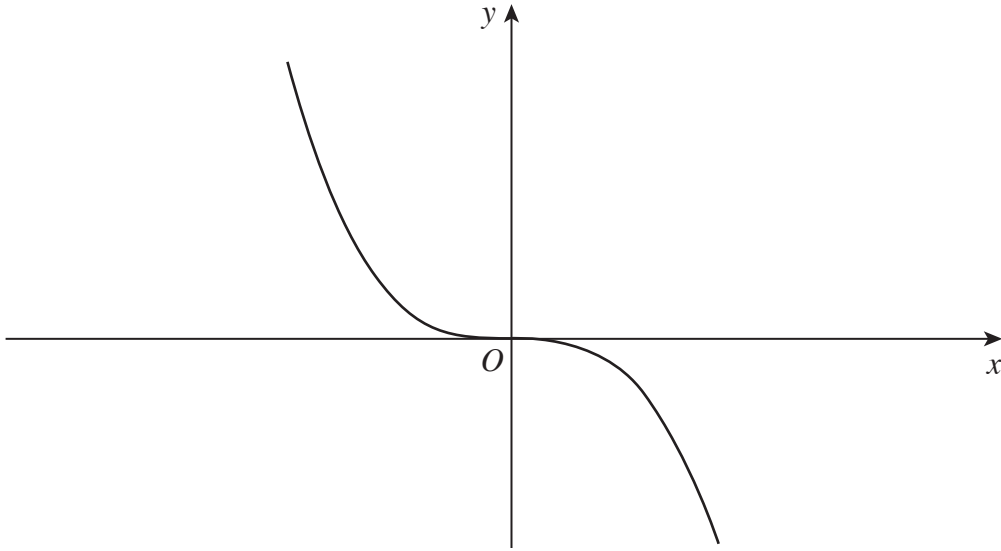
$$\frac{12}{5}$$

$$\frac{12}{13}$$



11 For each of the graphs, circle the equation that could be correct.

11 (a)



[1 mark]

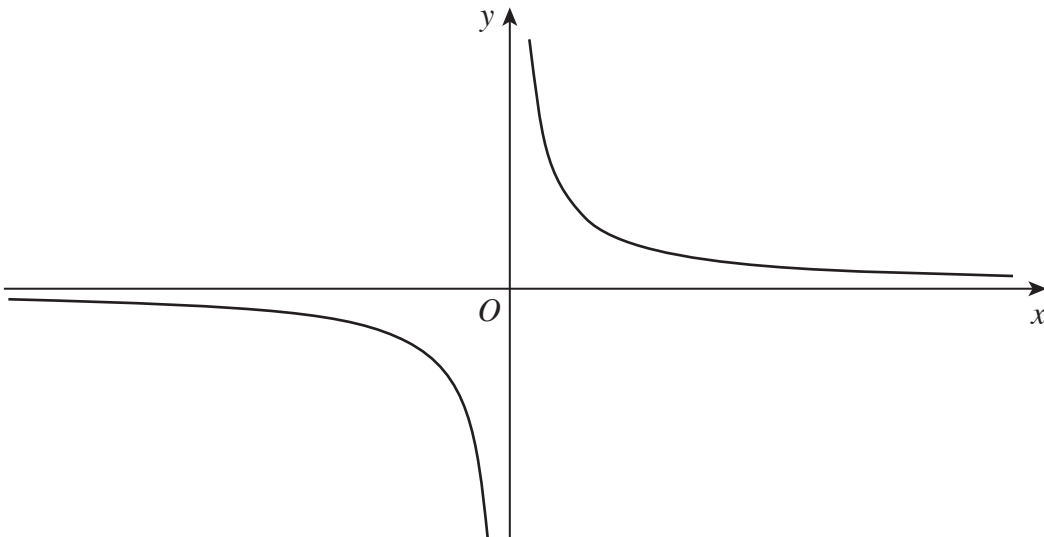
$$y = -x^2$$

$$y = x^2$$

$$y = -x^3$$

$$y = x^3$$

11 (b)



[1 mark]

$$y = \sqrt{x}$$

$$y = \frac{1}{x}$$

$$y = 2^x$$

$$y = \tan x$$

Turn over for the next question

Turn over ►



12 A and B are independent events.

$$P(A) = 0.45$$

$$P(A \text{ and } B) = 0.315$$

There are three trials.

Work out the probability of B happening in all three trials.

[3 marks]

Answer _____



13 Solve the simultaneous equations

$$y = 3x - 18$$

$$y = x^2 + 15x + 17$$

[5 marks]

Answer _____

END OF SECTION A

8



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