MATHS ONLINE

By: Kru Tar

9/A*
TOP MATHS

คอร์สตะลุยโจทย์

Intensive Maths IGCSE

BOOSTER

OCT/NOV 2023

Kru Tar

Day 1

TOPMaths
A* Level

Pearson Edexcel International GCSE

Specification A (9-1)

4MA1

First exam June 2018

Higher Tier 1H/1HR and 2H/2HR

MATHS ONLINE

By: Kru Tar

Paper 1H/1HR and 2H/2HR

1) Numbers and the number system 2) Equations, formulae and identities 3) Sequences, functions and graphs	57-63%
4) Geometry and trigonometry 5) Vectors and transformation geometry	22-28%
6) Statistics and probability	12-18%

Grade 9-1

Paper 1H/1HR

2 hours

50%

100 marks

Paper 2H/2HR

2 hours

50%

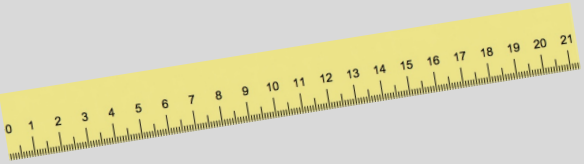
100 marks

Mathematics A													
Overall grade boundaries			**Max Mark**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**U**
4MA1	Mathematics A (Foundation) Paper(s) 1F 2F	Subject	200					140	117	86	55	24	0
4MA1	Mathematics A (Higher) Paper(s) 1H 2H	Subject	200	152	123	95	75	55	35	25			0
4MA1	Mathematics A (Foundation) Paper(s) 1FR 2FR	Subject	200					137	108	78	48	18	0
4MA1	Mathematics A (Higher) Paper(s) 1HR 2HR	Subject	200	160	131	103	80	58	36	25			0

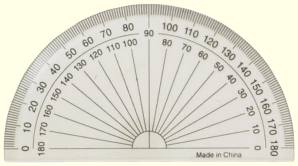
MATHS ONLINE

By: Kru Tar

1) Ruler in cm and mm



2) Protractor

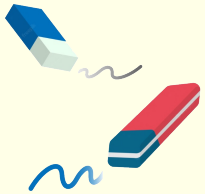


3) Pair of compasses

4) Pen (Black)

5) HB Pencil

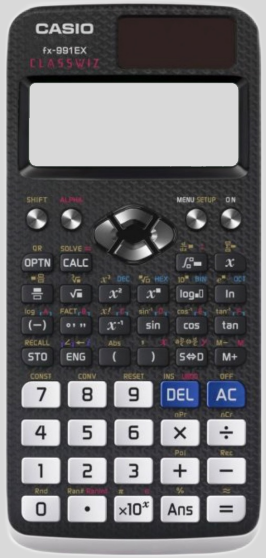
6) Eraser



7) Calculator

Casio fx-991ES Plus

Tracing paper (Provided)



Casio fx-991EX Classwiz

TOPMaths
A* Level

MATHS ONLINE

By: Kru Tar

Formula sheet

International GCSE Mathematics

Formulae sheet – Higher Tier

Arithmetic series

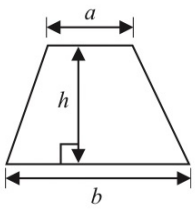
Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$

The quadratic equation

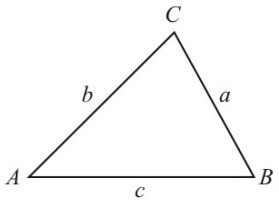
The solutions of $ax^2 + bx + c = 0$ where $a \neq 0$ are given by:

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

Area of trapezium $= \frac{1}{2}(a+b)h$



Trigonometry



In any triangle ABC

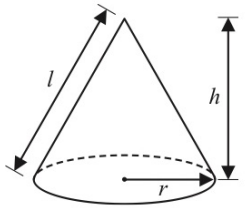
Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

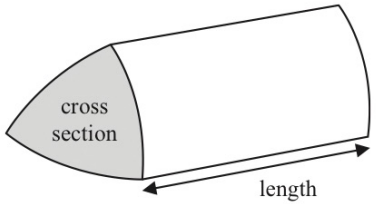
Area of triangle $= \frac{1}{2}ab\sin C$

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

Curved surface area of cone $= \pi rl$

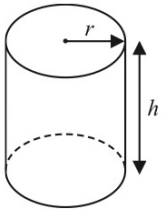


Volume of prism
= area of cross section × length



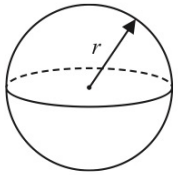
Volume of cylinder $= \pi r^2 h$

Curved surface area of cylinder $= 2\pi rh$



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

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



TOPMaths
A* Level

MATHS ONLINE

By: Kru Tar

Read carefully

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.
  Anything you write on the formulae page will gain NO credit.

Non-exact numerical answers

3 s.f.

1 d.p. for angles

2 d.p. for money

MATHS ONLINE

By: Kru Tar

TOPICS

1.8 Set and Venn diagram

The set of ➡ { }

The set of all x such that ➡ {x: }

The number of elements in the set A ➡ n(A)

e.g. A = {1, 2, 3}
B = {x: x is an integer}
C = {(x,y) : y = 2x+1}
D = {x: 2<x<10}
E = {a, b, c, d}

Universal set ➡ $\mathscr{E}$

The empty(null) set ➡ $\varnothing$

is an element of ➡ $\in$

is not an element of ➡ $\notin$

is a subset of ➡ $\subset$

is not a subset of ➡ $\not\subset$

Union ➡ $\cup$

Intersection ➡ $\cap$

Complement ➡ A'

1.8 Set and Venn diagram

Ex. Universal sets $\mathscr{E} = \{ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 \}$

$A = \{ 1, 2, 3, 8 \}$

$B = \{ 2, 3, 6, 7 \}$

$C = \{ 1, 8 \}$

$n(A) = 4$

$2 \in A$

$4 \notin A$

$C \subset A$

$B \not\subset A$

1.8 Set and Venn diagram

Ex. Universal sets $\mathscr{E}$ = { 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 }

A = { 1, 2, 3, 8 }

B = { 2, 3, 6, 7 }

C = { 1, 8 }

Union (or) $A \cup B =$

Intersection (and) $A \cap B =$

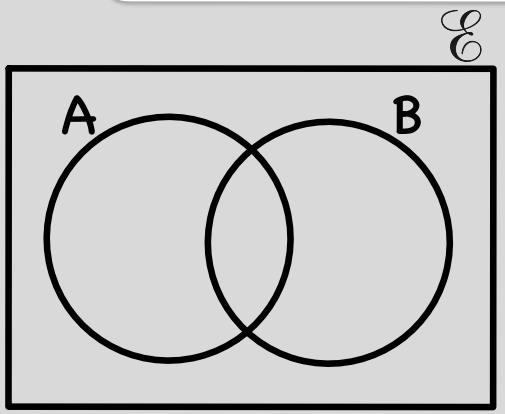
Complement (Not) $A' =$

Empty/Null set $B \cap C =$

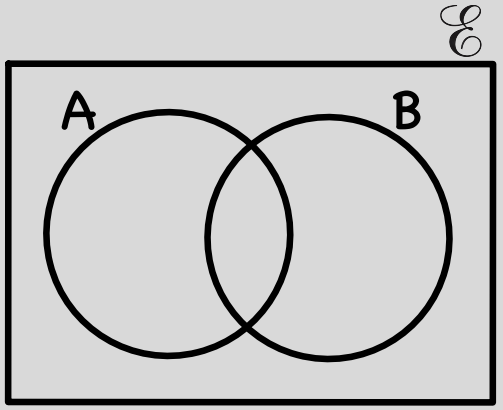
MATHS ONLINE

By: Kru Tar

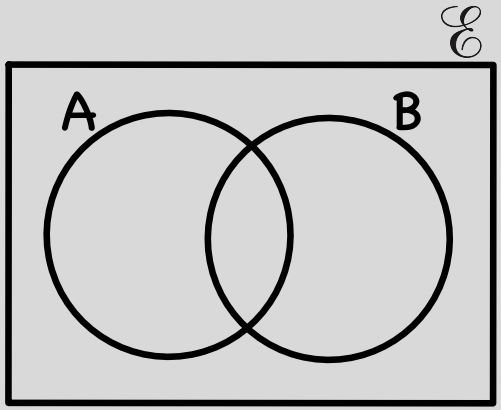
1.8 Set and Venn diagram



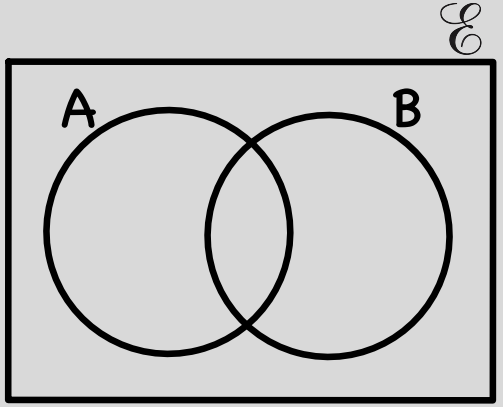
$A \cup B$



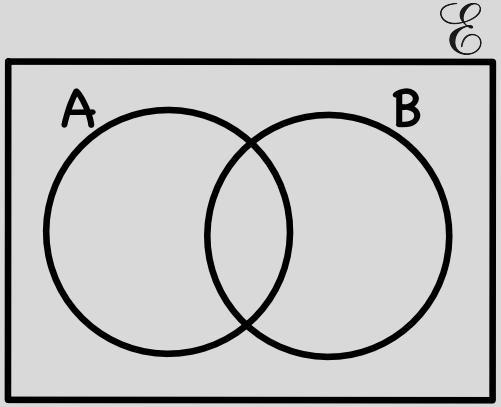
A'



$A \cap B$



$A \cap B'$



$A \cup B'$

1.8 Set and Venn diagram

1.

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$A = \{2, 3, 5, 7\}$
$B = \{4, 6, 8, 10\}$

(a) Explain why $A \cap B = \varnothing$

.....

.....

.....

(1)

$x \in \mathscr{E}$ and $x \notin A \cup B$

(b) Write down the **two** possible values of x.

..... , ...

(1)

1.

$\mathscr{E} = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
$A = \{2, 3, 5, 7\}$
$B = \{4, 6, 8, 10\}$

Set C is such that

$A \cup B \cup C = \mathscr{E}$
$A \cap C = \{2\}$
$B \cap C' = \{4, 6, 10\}$

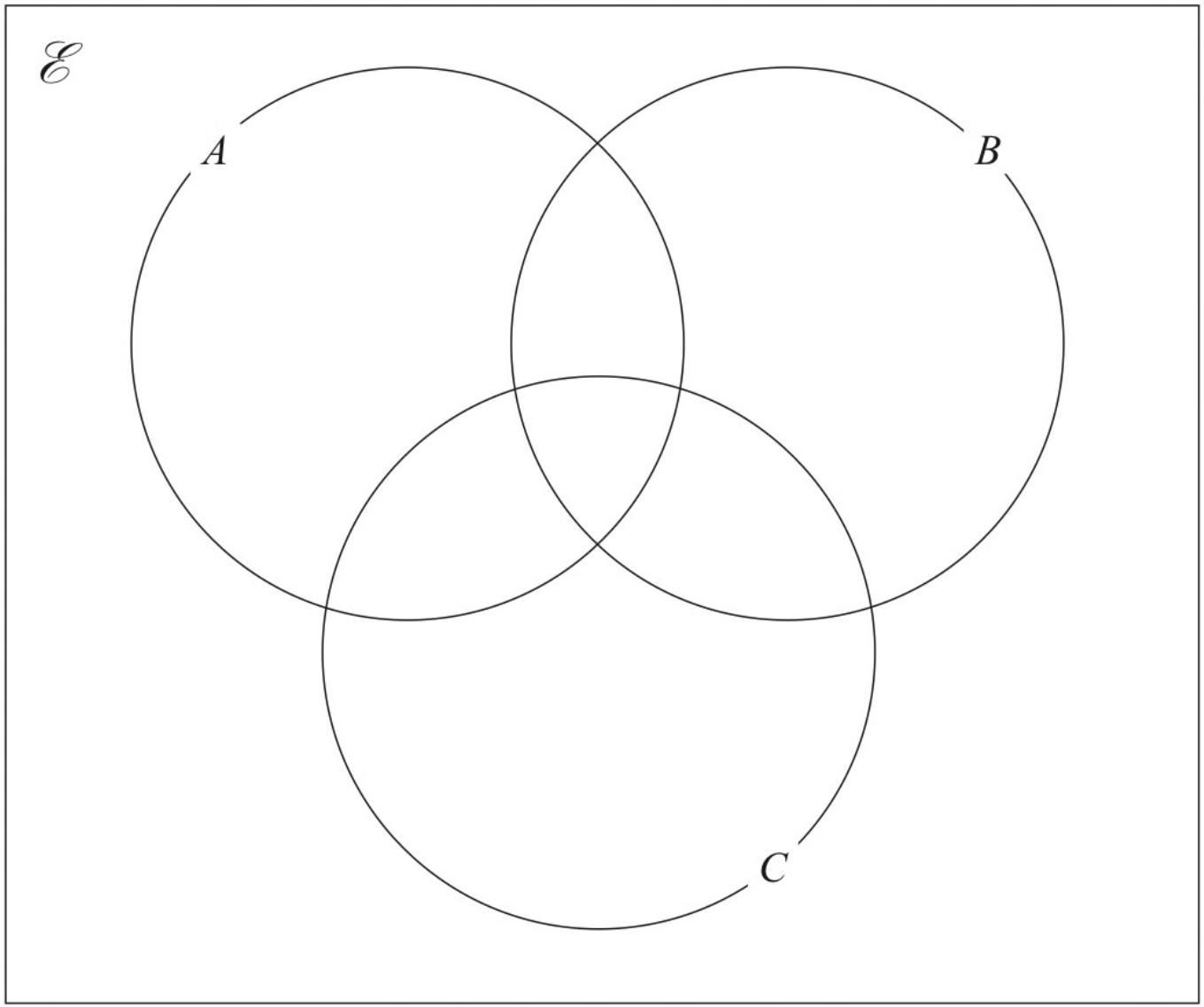
(c) List all the members of set C.

.....

(2)

2.

(a) On the Venn diagram, shade the set $(A \cup B)' \cap C$

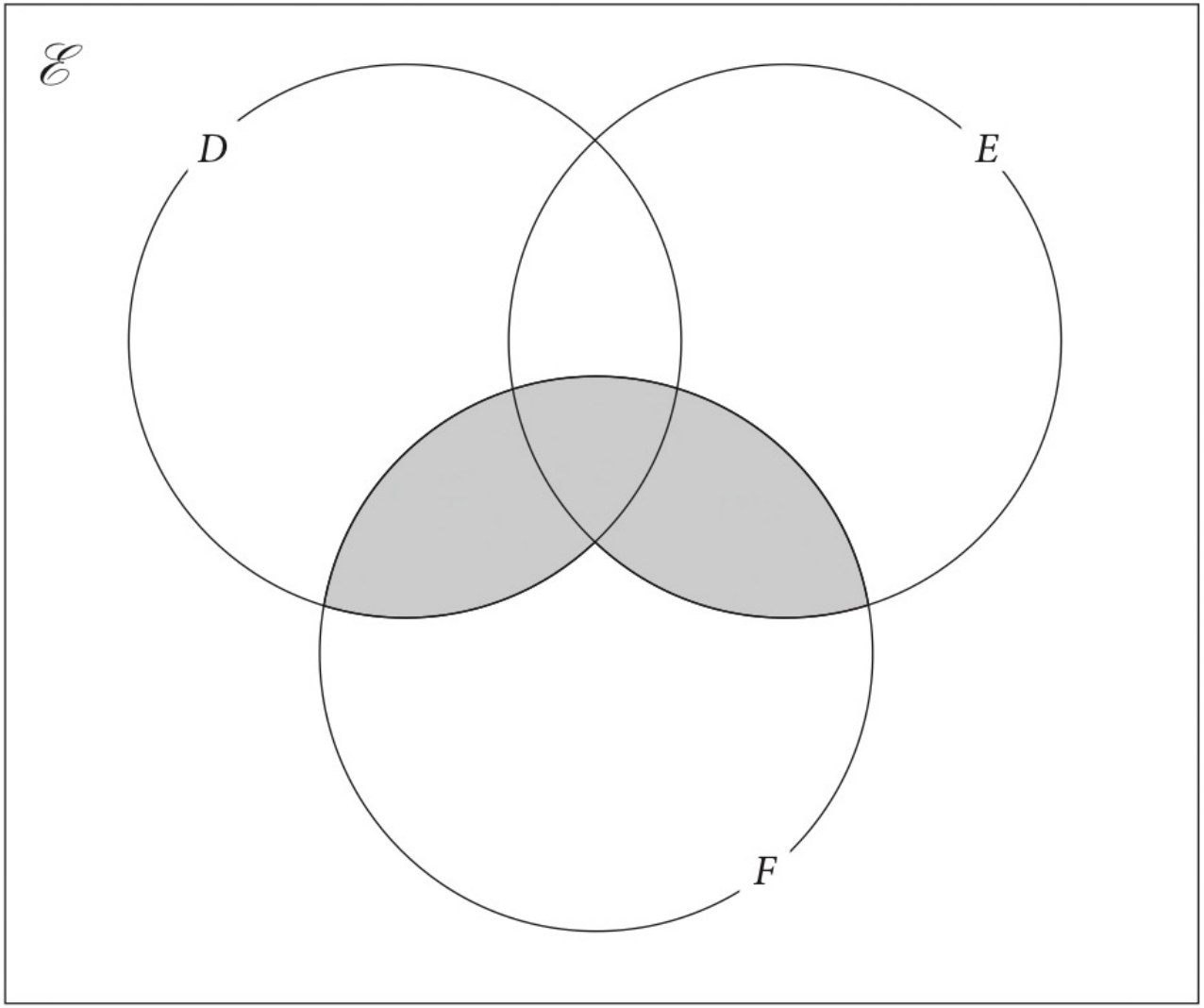


(1)

TOPMaths A* Level

2.

(b) Use set notation to describe the shaded region in the Venn diagram below.



.....

(1)

TOPMaths
A* Level

3.

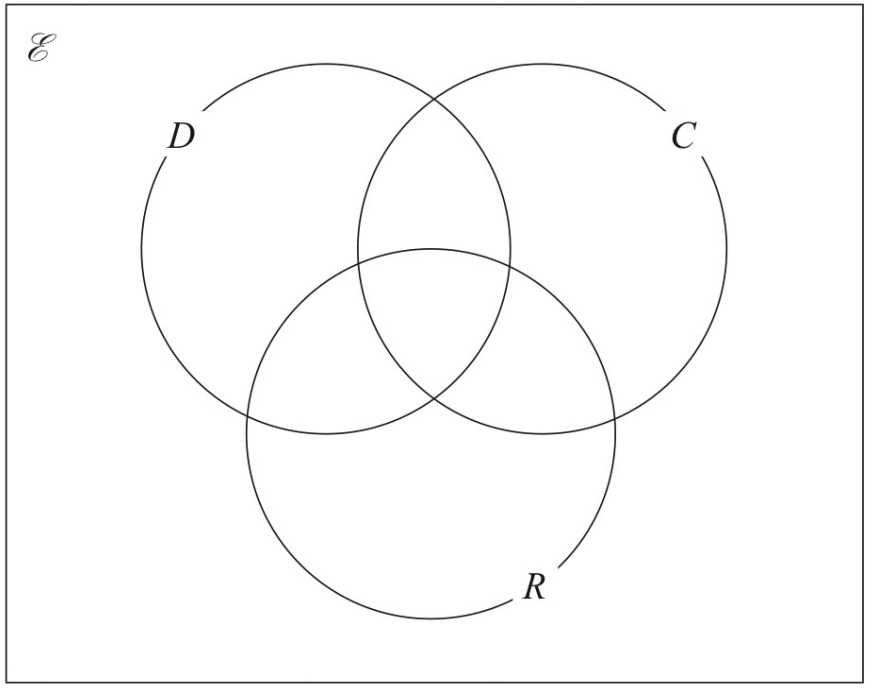
Some students in a school were asked the following question.

"Do you have a dog (D), a cat (C) or a rabbit (R)?"

Of these students

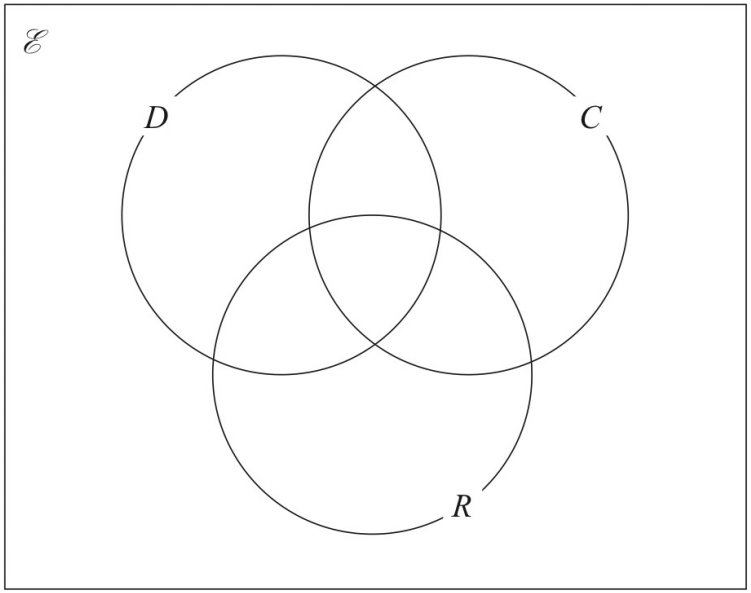
28 have a dog
18 have a cat
20 have a rabbit
8 have both a cat and a rabbit
9 have both a dog and a rabbit
x have both a dog and a cat
6 have a dog, a cat and a rabbit
5 have not got a dog or a cat or a rabbit

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.
Give the numbers in terms of x where necessary.



(3)

3.



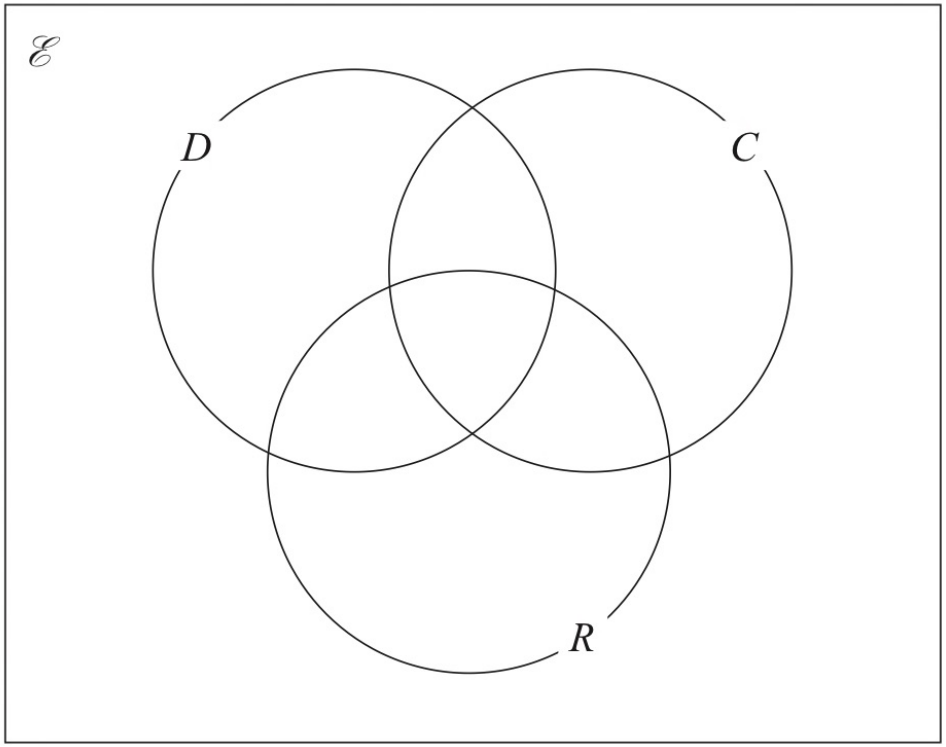
Given that a total of 50 students answered the question,

(b) work out the value of x.

$x =$ .....

(2)

3.



(c) Find $n(C' \cap D')$

.....

(1)

4.

$\mathscr{E}$ = {integers x such that $10 \leqslant x \leqslant 25$}
$A = \{x : x < 18\}$
$B = \{x : 13 \leqslant x < 22\}$

(a) Write down n(A)

.....

(1)

(b) List the members of the set $(A \cup B)'$

.....

(2)

4.

$\mathscr{E}$ = {integers x such that $10 \leqslant x \leqslant 25$}
$A = \{x : x < 18\}$
$B = \{x : 13 \leqslant x < 22\}$

(c) List the members of the set $A' \cap B$

.....

(2)

$C \subset A$, $C \subset B$ and $n(C) = 5$

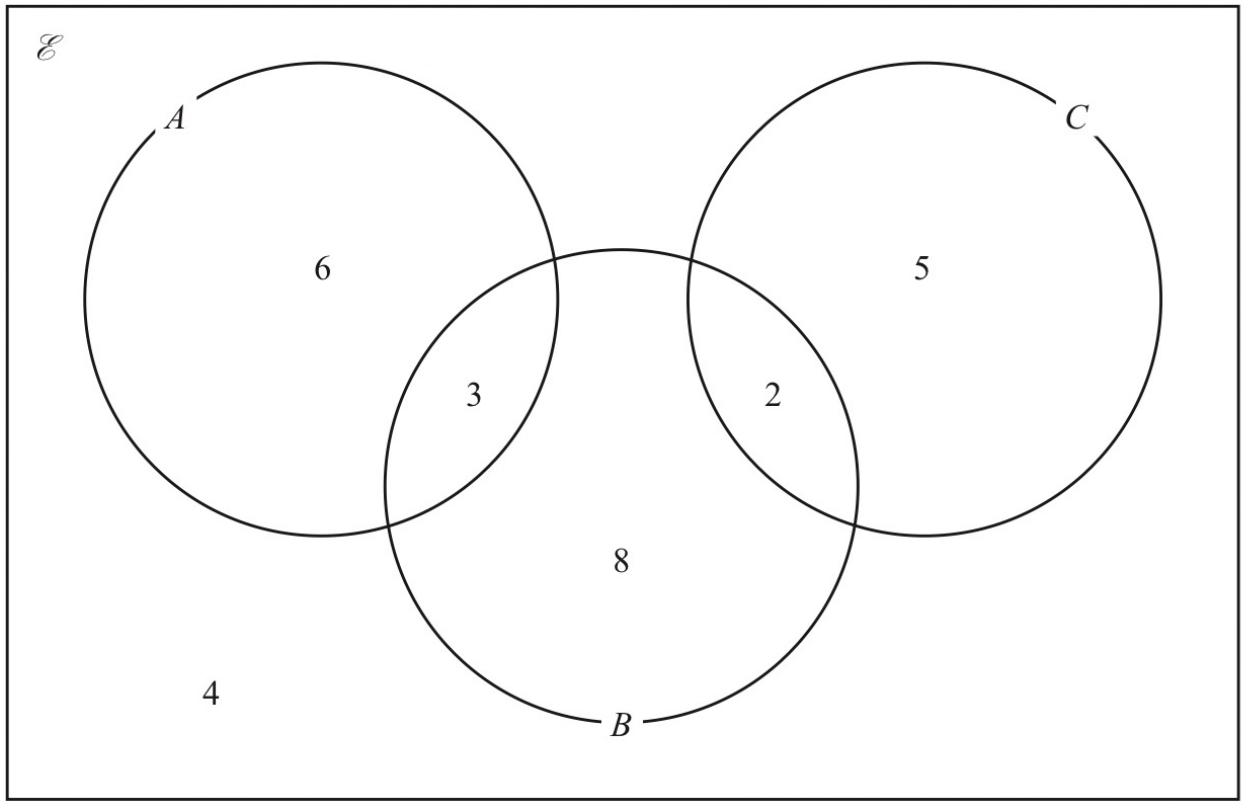
(d) List the members of the set C

.....

(1)

5.

The Venn diagram shows a universal set $\mathscr{E}$ and three sets A, B and C.



Find

6, 3, 8, 2, 5 and 4 represent the **numbers** of elements.

(i) $n(A \cup B)$

.....

(1)

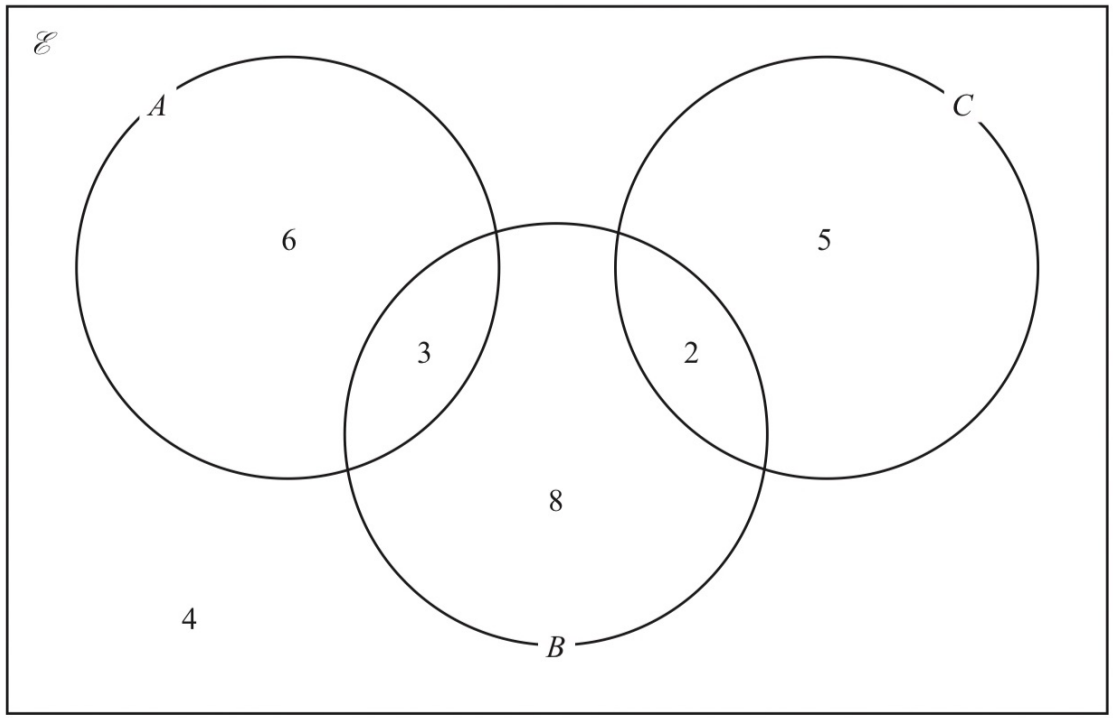
(ii) $n(A \cap C)$

.....

(1)

TOPMaths A* Level

5.



6, 3, 8, 2, 5 and 4 represent the **numbers** of elements.

(iii) $n(B \cap C')$

.....

(1)

(iv) $n(A' \cup B' \cup C')$

.....

(1)

6.

$\mathscr{E} = \{9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$
$A = \{\text{multiples of } 3\}$
$B = \{\text{odd numbers}\}$

(a) List the members of the set

(i) $A \cap B$

.....

(1)

(ii) $A \cup B$

.....

(1)

(b) Is it true that $24 \in A$?

Tick one of the boxes below.

Yes	No
☐	☐

Give a reason for your answer.

.....

.....

(1)

$\mathscr{E} = \{9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$
$A = \{\text{multiples of 3}\}$
$B = \{\text{odd numbers}\}$

Set C has 4 members such that $C \cap B' = \{10, 18\}$

6. (c) List the members of one possible set C

.....

(2)

MATHS ONLINE

By: Kru Tar

6.1 Probability

1) An **experiment** is a repeatable process that gives rise to a number of outcomes.

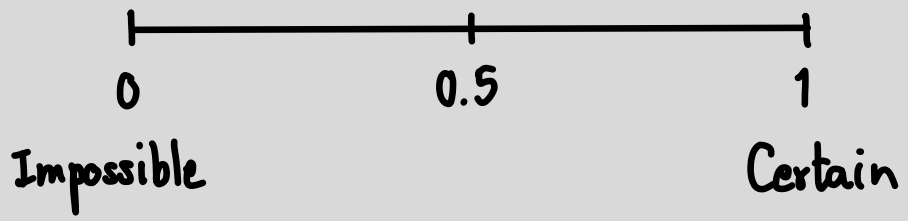
2) A **sample space** is the set of all possible outcomes of an experiment.

3) An **event** is a collection of one or more outcomes.

4) The **probability** of an event is the chance that the event will occur as a result of an experiment.

5) Where outcomes are **equally likely** the probability of an event is the number of outcomes in the event divided by the total number of possible outcomes in the sample space.

$$\text{Probability} = \frac{n(E)}{n(S)}$$



Conditional probability

Tossing a fair dice. 1, 2, 3, 4, 5, 6

Probability that getting 5 is

Given that a dice shown an odd number,

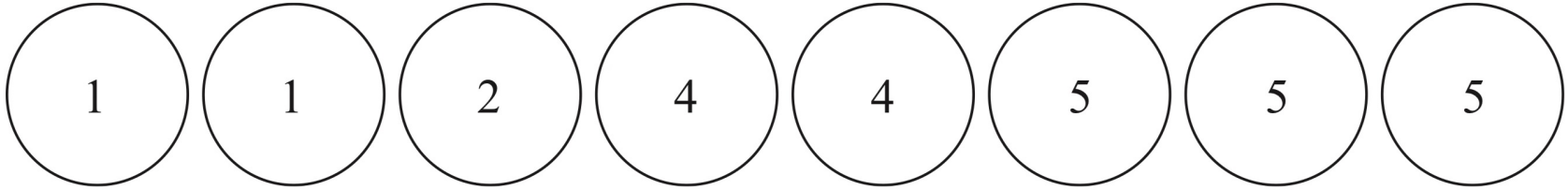
the probability of getting 5 is

6.1 Probability

TOPMaths A* Level

7.

There are 8 counters in a bag.
There is a number on each counter.



Fiona takes at random **three** of the counters.
She adds the numbers on the **three** counters to get her total.

Work out the probability that her total is an odd number.

.....

(Total for Question 16 is 4 marks)

8.

There are 12 beads in a bag.

7 of the beads are red.
3 of the beads are green.
2 of the beads are yellow.

Lucy takes at random a bead from the bag and keeps it.
Then Julian takes at random a bead from the bag.

(a) Work out the probability that they each take a yellow bead.

(2)

8.

There are 12 beads in a bag.

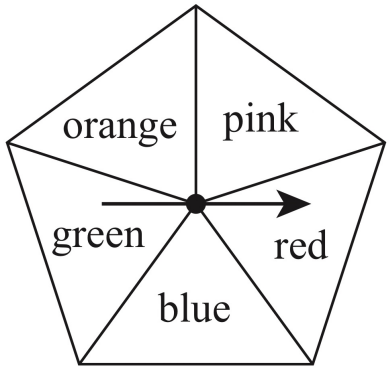
7 of the beads are red.
3 of the beads are green.
2 of the beads are yellow.

Lucy takes at random a bead from the bag and keeps it.
Then Julian takes at random a bead from the bag.

(b) Work out the probability that the beads they take are **not** the same colour.

(3)

9. Grace has a biased 5-sided spinner.



Grace is going to spin the arrow on the spinner once.

The table below gives the probabilities that the spinner will land on red or on blue or on green.

Colour	Red	Blue	Green	Orange	Pink
Probability	0.20	0.12	0.08		

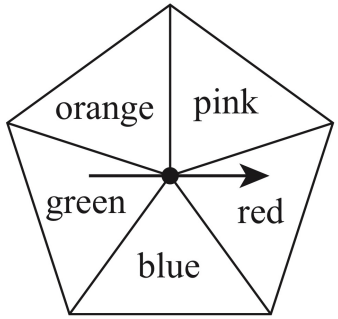
The probability that the spinner will land on orange is 3 times the probability that the spinner will land on pink.

(a) Work out the probability that the spinner will land on orange.

.....

(3)

9.



Grace is going to spin the arrow on the spinner once.

The table below gives the probabilities that the spinner will land on red or on blue or on green.

Colour	Red	Blue	Green	Orange	Pink
Probability	0.20	0.12	0.08		

Grace spins the arrow on the spinner 150 times.

(b) Work out an estimate for the number of times the spinner lands on blue.

.....

(2)

TOPMaths
A* Level

10.

Abraham is going to play a computer game.
Abraham can win the game, draw the game or lose the game.

For any game that Abraham plays

the probability that he wins the game is 0.3
the probability that he draws the game is 0.5
the probability that he loses the game is 0.2

When Abraham wins a game, he scores +10 points.
When Abraham draws a game, he scores 0 points.
When Abraham loses a game, he scores −5 points.

Abraham plays 3 games and the points he scores in each of the 3 games are added together to get his total score.

Work out the probability that when he has played 3 games his total score is 0 points.

.....

(Total for Question 15 is 4 marks)

TOPMaths
A* Level

11.

In a bag, there are only red counters, blue counters, green counters and yellow counters.

The total number of counters in the bag is 80

In the bag

the number of red counters is $x + 7$
the number of blue counters is $x - 11$
the number of green counters is $3x$

Jude takes at random a counter from the bag.

The probability that he takes a red counter is $\frac{1}{4}$

Work out the probability that Jude takes a yellow counter.

.....

(Total for Question 6 is 4 marks)

12.

Moeen has a biased 6-sided dice.

The table gives information about the probability that, when the dice is thrown, it will land on each number.

Number	1	2	3	4	5	6
Probability	x	0.15	0.5	y	0.13	0.03

(a) Show that $x + y = 0.19$

Given that $3x - y = 0.09$

and $x + y = 0.19$

(2)

(b) work out the value of x and the value of y
Show clear algebraic working.

$x =$ .....

$y =$ .....

(3)

6.2 Probability from Venn diagrams

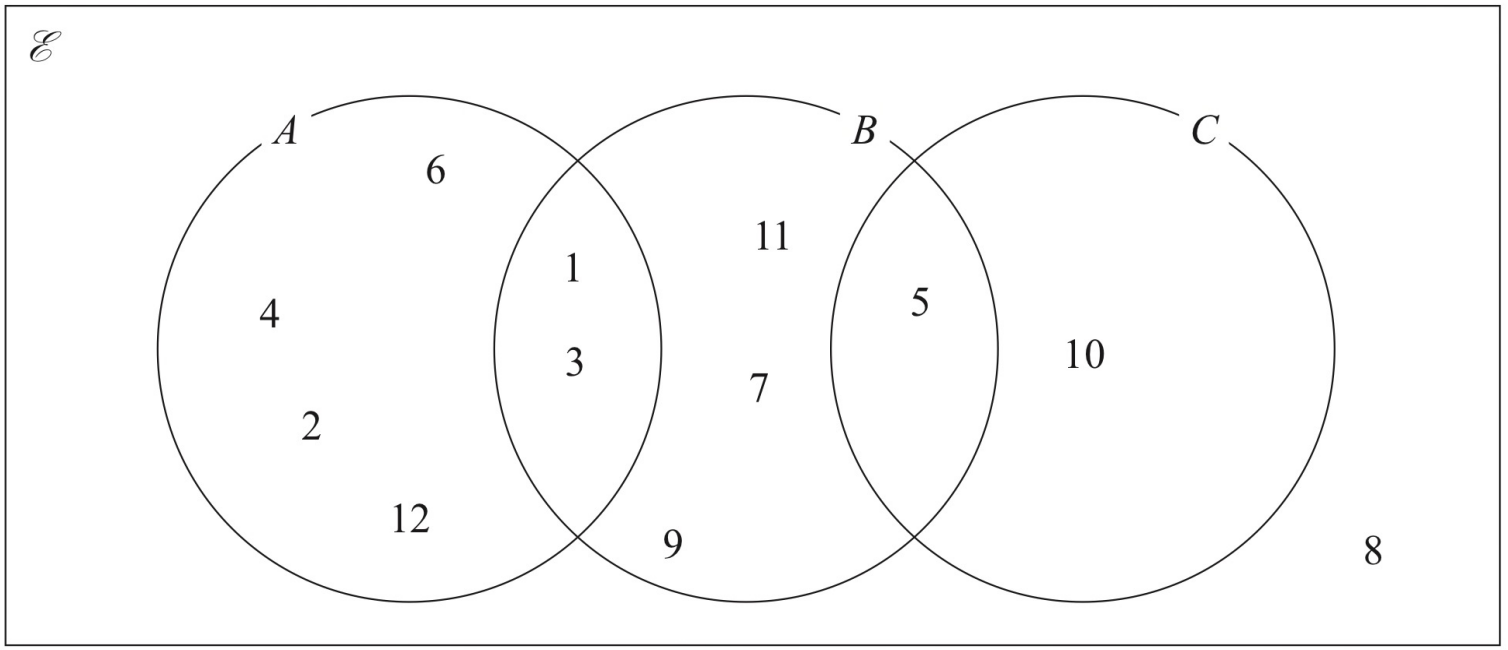
OR	Union	$A \cup B$
AND	Intersection	$A \cap B$
NOT	Complement	A'

6.2 Probability from Venn diagrams

TOPMaths A* Level

13.

Here is a Venn diagram.



One of the numbers in the Venn diagram is picked at random.

(c) Find the probability that this number is in set C'

.....

(2)

TOPMaths A* Level

14.

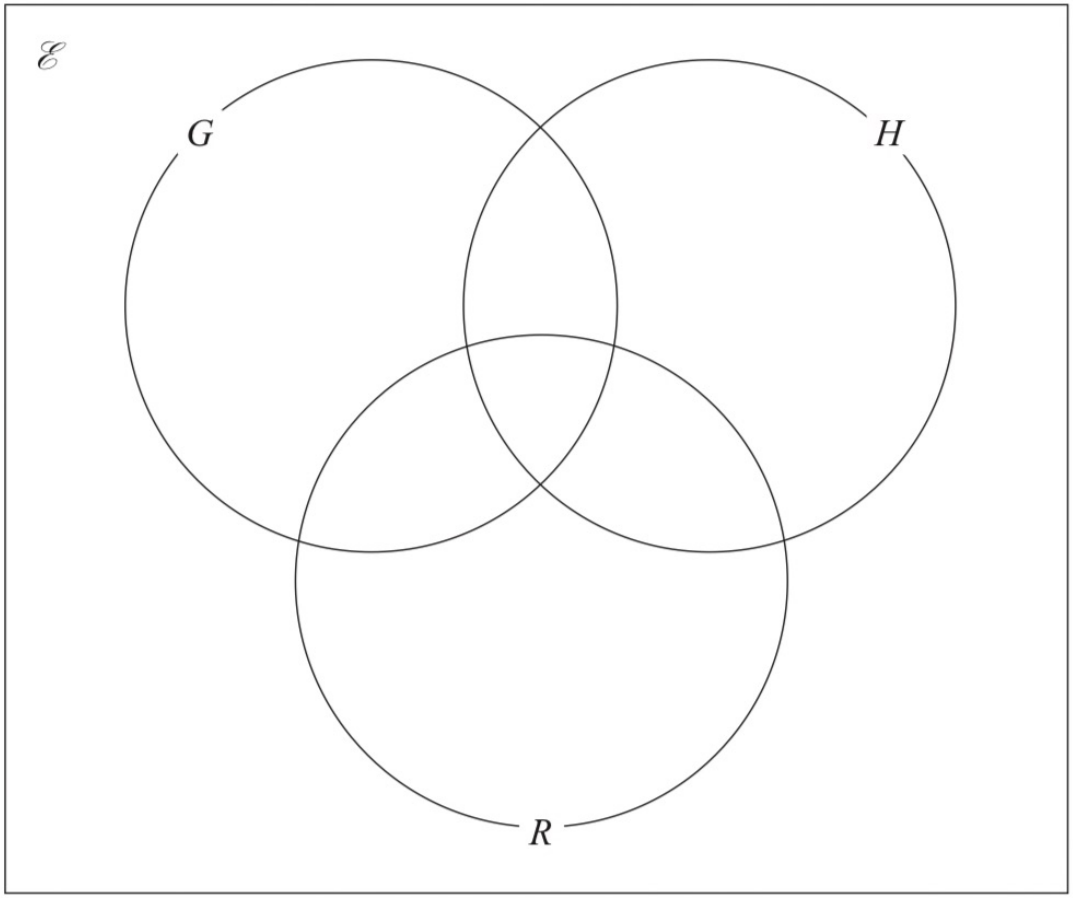
All the students in Year 11 at a school must study at least one of Geography (G), History (H) and Religious Studies (R).

In Year 11 there are 65 students.

Of these students

15 study Geography, History and Religious Studies
21 study Geography and History
16 study Geography and Religious Studies
30 study Geography
18 study only Religious Studies
37 study Religious Studies

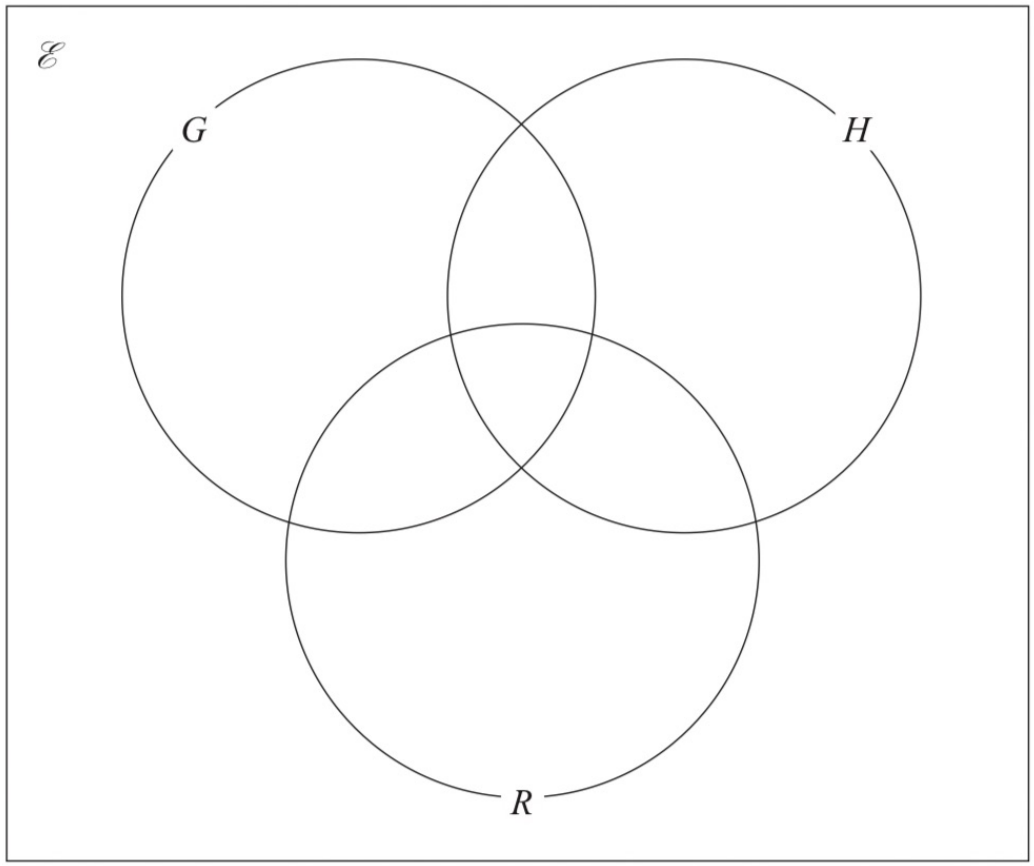
(a) Using this information, complete the Venn diagram to show the number of students in each region of the Venn diagram.



(3)

TOPMaths
A* Level

14.



A student in Year 11 who studies both History and Religious Studies is chosen at random.

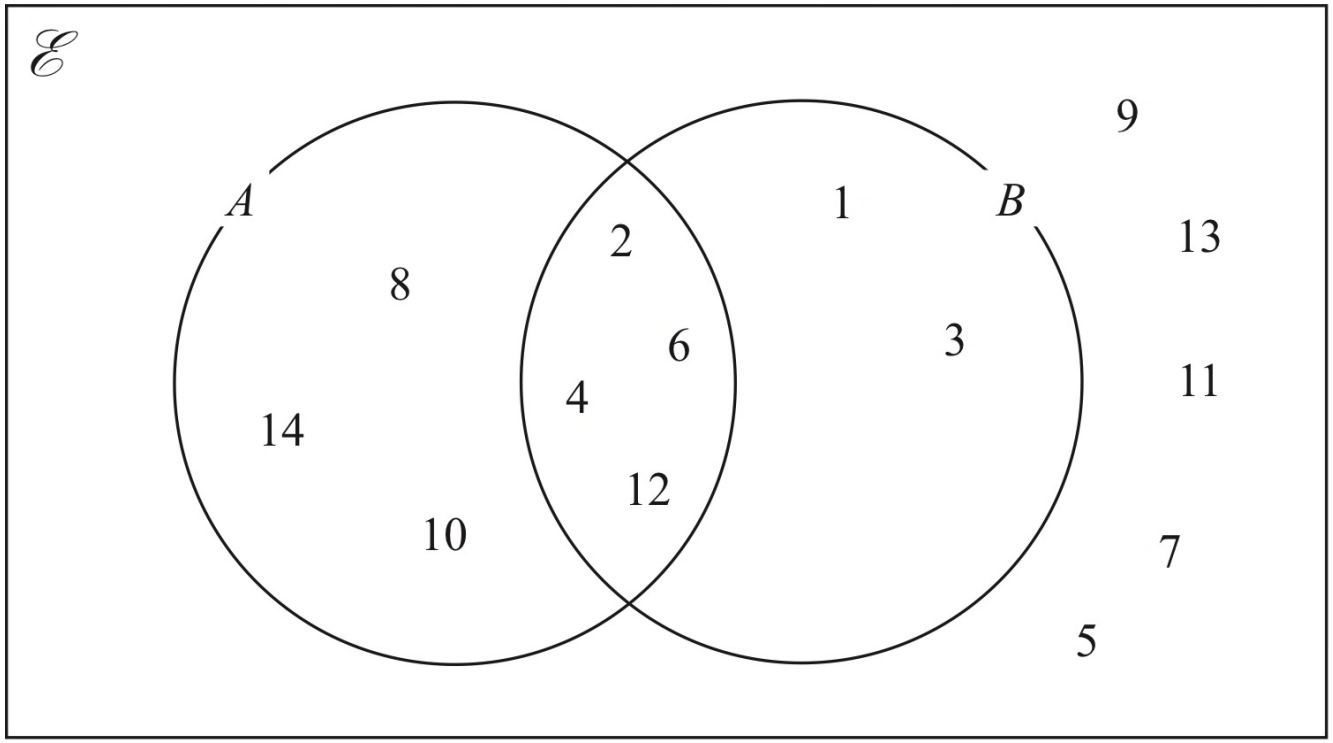
(b) Work out the probability that this student does **not** study Geography.

(2)

TOPMaths A* Level

15.

The numbers from 1 to 14 are shown in the Venn diagram.



A number is picked at random from the numbers in the Venn diagram.

(c) Find the probability that this number is in set A but is **not** in set B.

.....

(2)

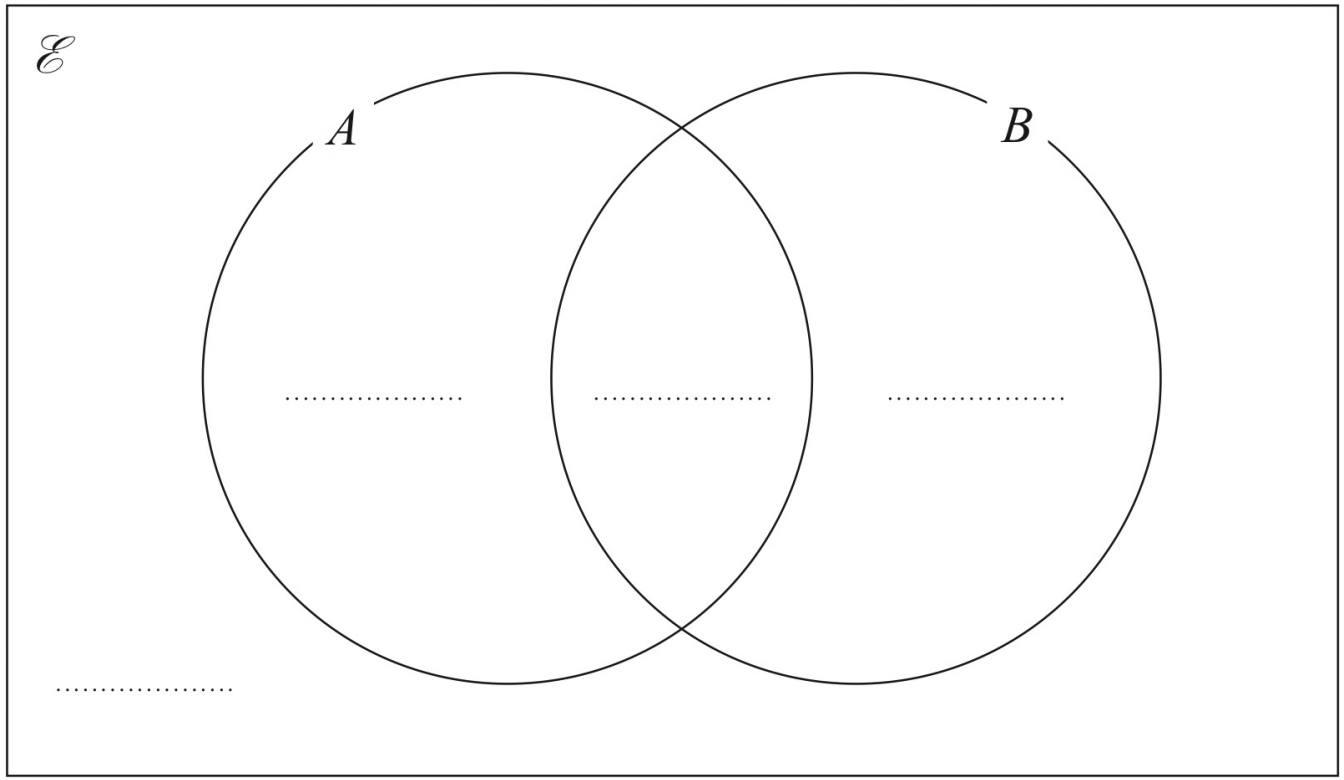
TOPMaths A* Level

16.

Two events A and B are such that $n(A) = 62$ $n(B) = 30$ and $n(A \cup B) = 68$

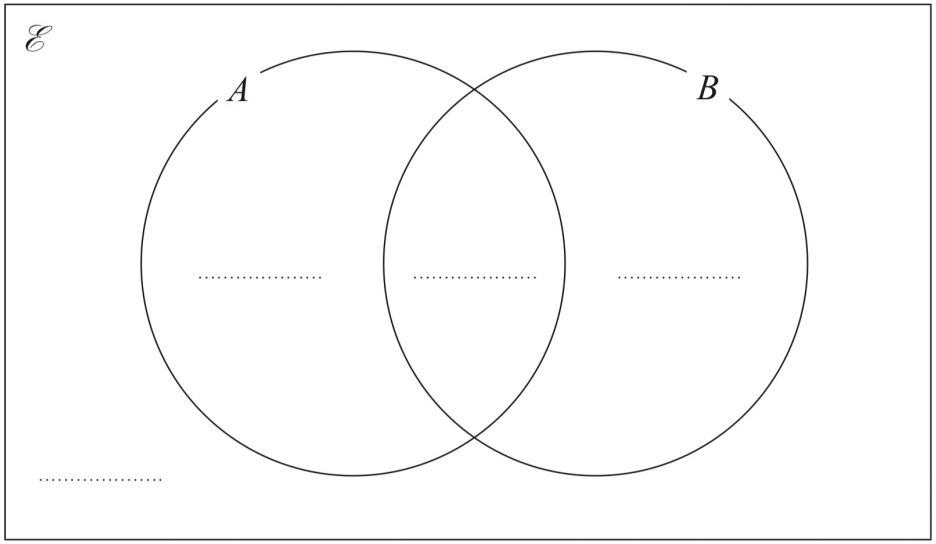
Given that $n(\mathscr{E}) = 80$

(a) complete the Venn diagram to show the number of elements in each region.



(2)

16. An element is chosen at random from $\mathscr{E}$.



(b) Using the Venn diagram, find the probability that this element is in

(i) $A \cap B$

.....

(1)

(ii) $A \cup B'$

.....

(2)

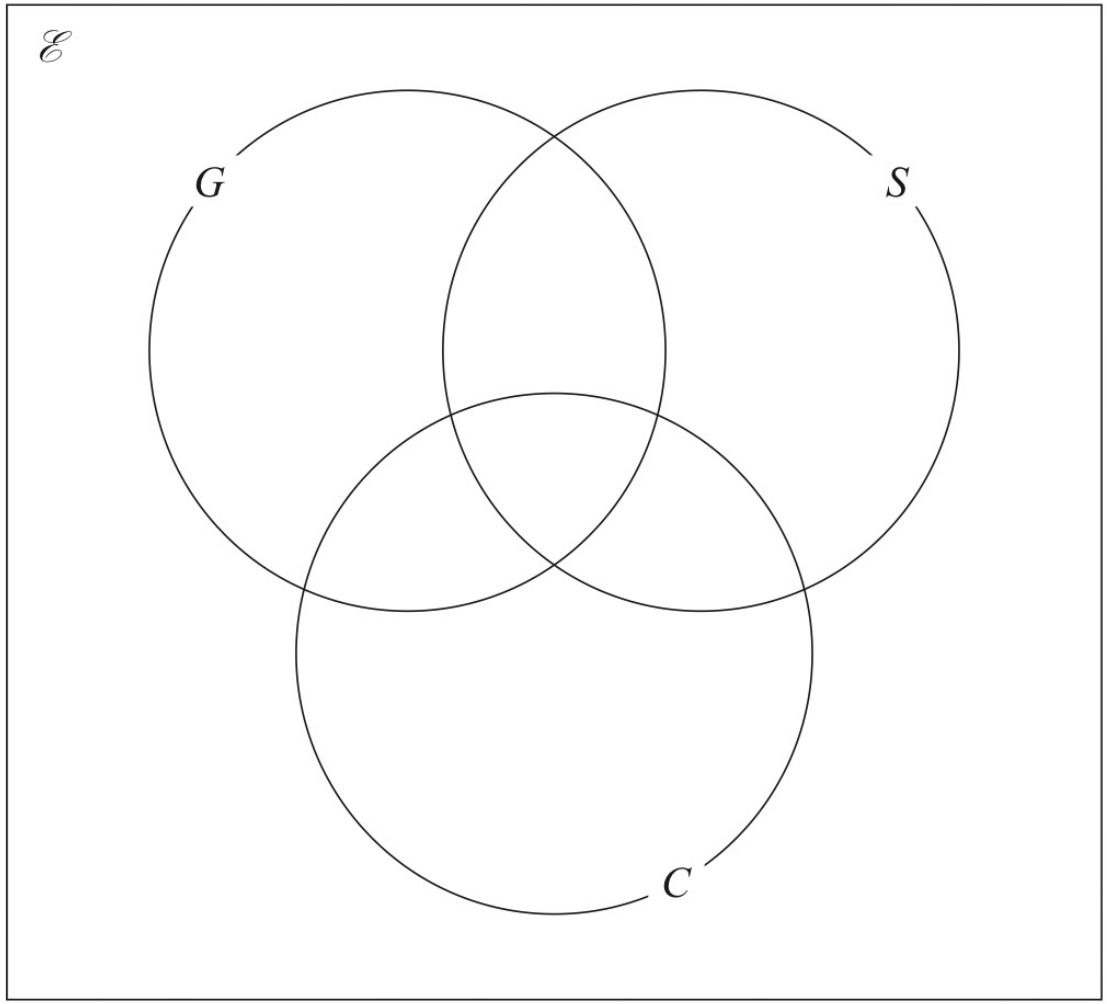
TOPMaths A* Level

17.

100 farmers are asked if they have goats (G), sheep (S) or chickens (C) on their farms.

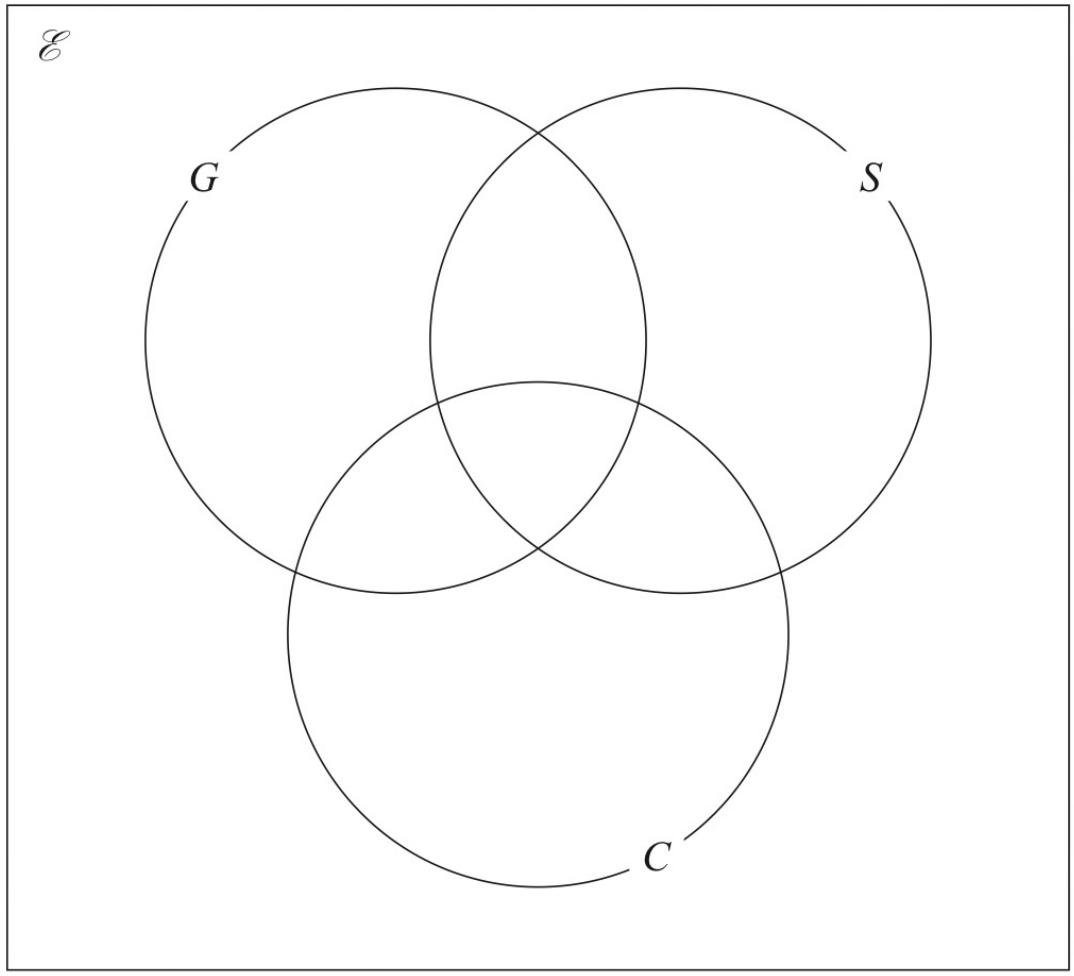
Of these farmers
- 31 have sheep
- 53 have chickens
- 6 have goats, sheep and chickens
- 11 have sheep and goats
- 17 have sheep and chickens
- 18 have goats and chickens
- 20 do not have any goats, sheep or chickens

(a) Using this information, complete the Venn diagram to show the number of farmers in each appropriate subset.



(3)

TOPMaths
A* Level
17.



One of the farmers who has chickens is chosen at random.

(c) Find the probability that this farmer also has goats.

.....

(2)

TOPMaths
A* Level

18.

30 adults booked to stay in a hotel.

19 adults booked breakfast
15 adults booked dinner
4 adults did not book breakfast or dinner

Some adults booked breakfast **and** dinner.

Meihui chooses at random two of the 30 adults.

Work out the probability that these two adults each booked breakfast **and** dinner.

.....

(Total for Question 19 is 4 marks)

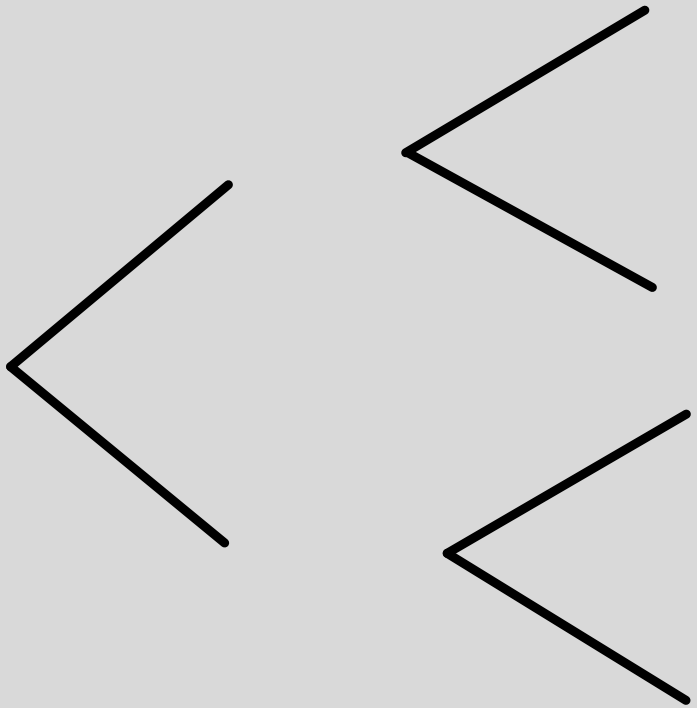
MATHS ONLINE

By: Kru Tar

6.10 Tree diagrams

RRRRR
GGG

Ex. A bag contains 5 red balls and 3 green balls. A ball is drawn at random and then replaced. Another ball is drawn. What is the probability that both balls are green? with replacement



MATHS ONLINE

By: Kru Tar

6.10 Tree diagrams

RRRRR
GGG

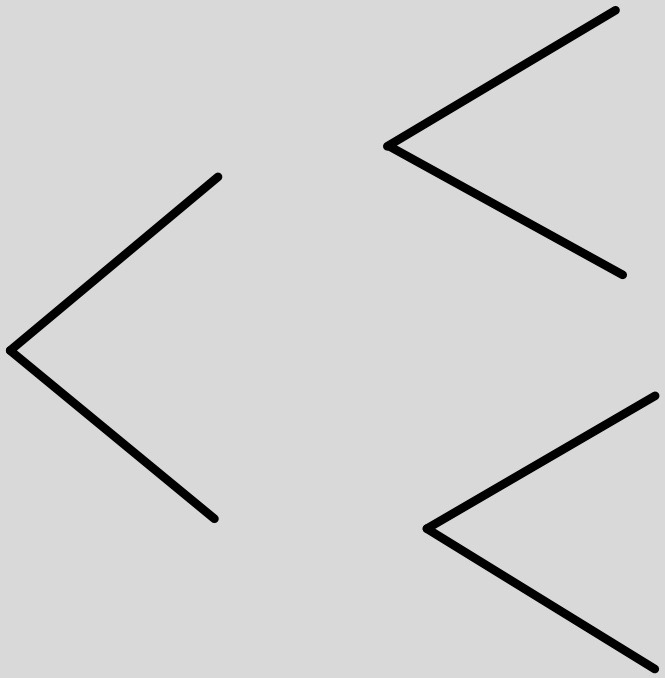
Ex. A bag contains 5 red and 3 green balls. A ball is selected at random and not replaced. A second ball is then selected. Find the probability of selecting:

a) two green balls

b) one red ball and one green ball

c) at least one green balls.

without replacement



6.10 Tree diagrams

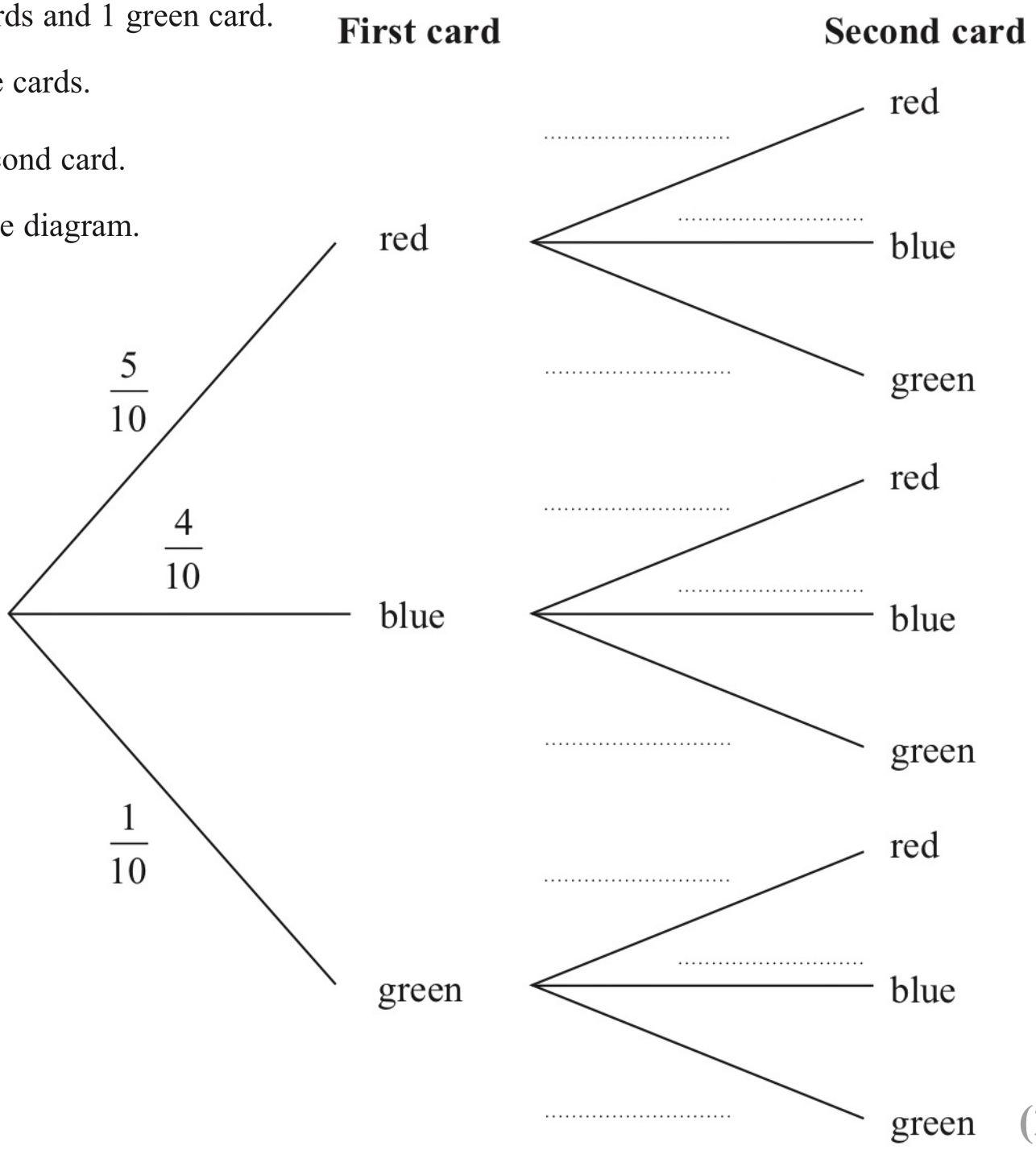
TOPMaths A* Level

19.

Felix has 10 cards.
There are 5 red cards, 4 blue cards and 1 green card.

Felix takes at random one of the cards.
He does not replace the card.
Felix then takes at random a second card.

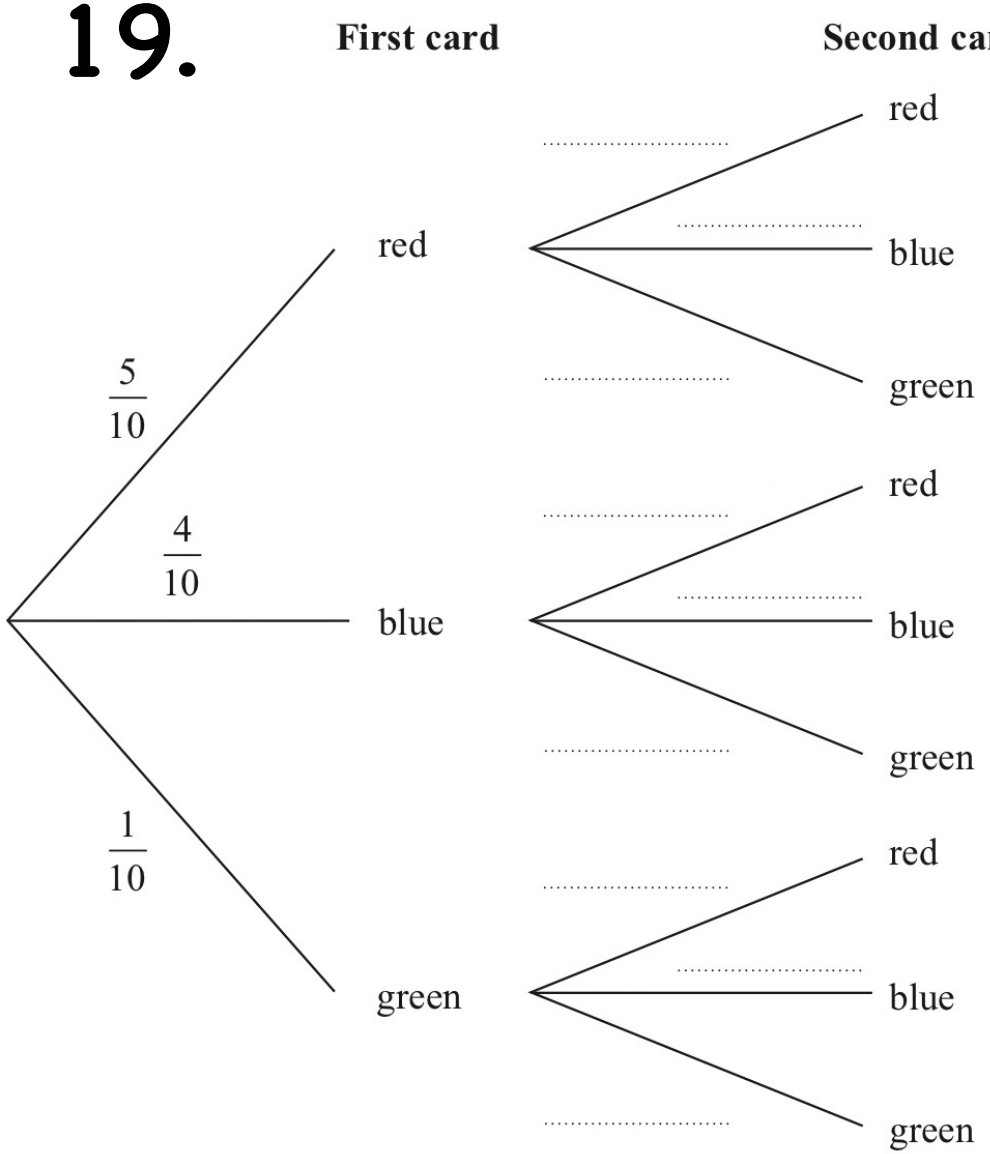
(a) Complete the probability tree diagram.



(2)

TOPMaths A* Level

19. (b) Work out the probability that Felix takes at least one blue card and no green card.



.....

(3)

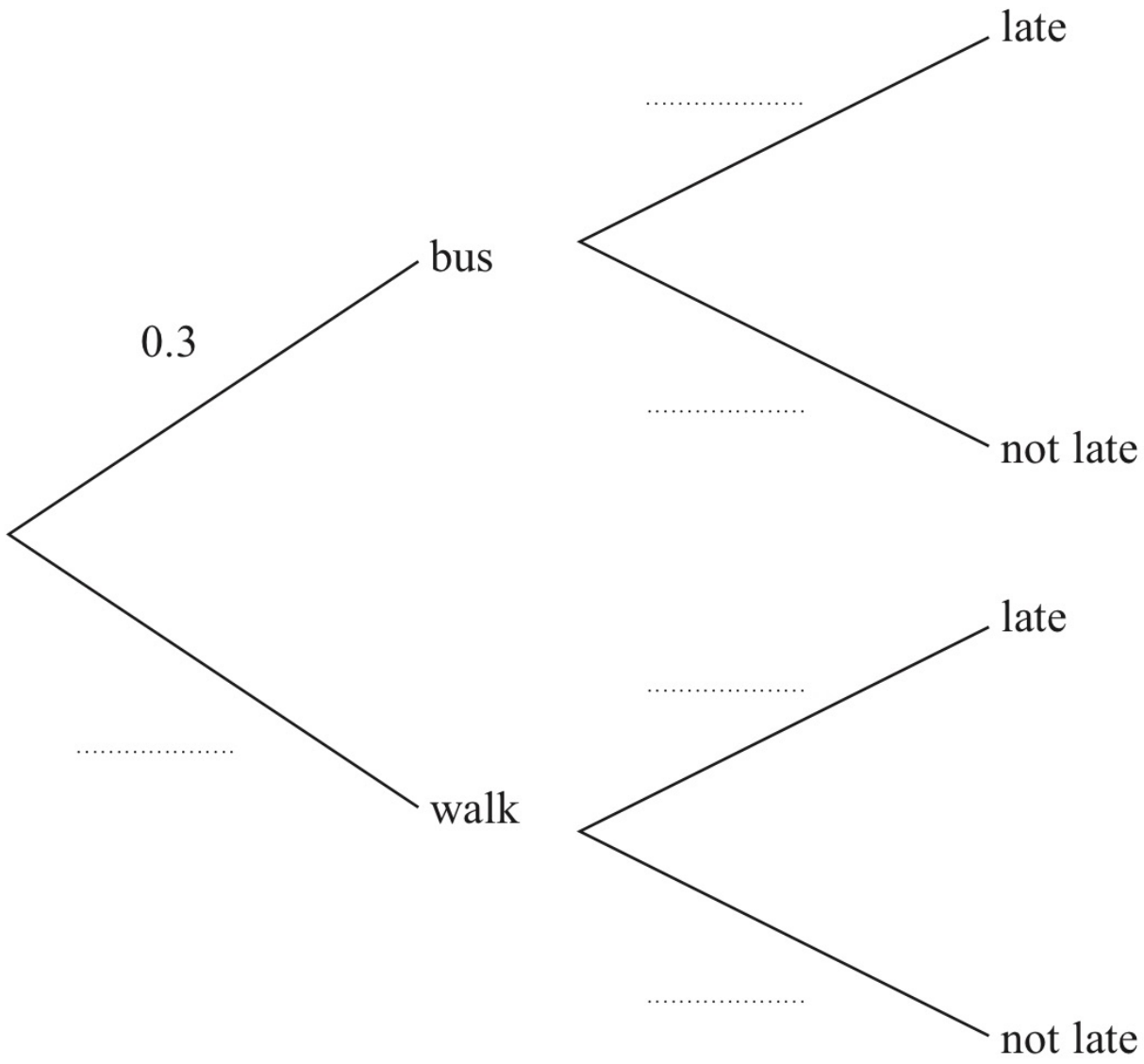
TOPMaths
A* Level

20.

Each day that Barney goes to college, he either goes by bus or he walks.
The probability that Barney will go to college by bus on any day is 0.3

When Barney goes to college by bus, the probability that he will be late is 0.2
When Barney walks to college, the probability that he will be late is 0.1

(a) Complete the probability tree diagram.

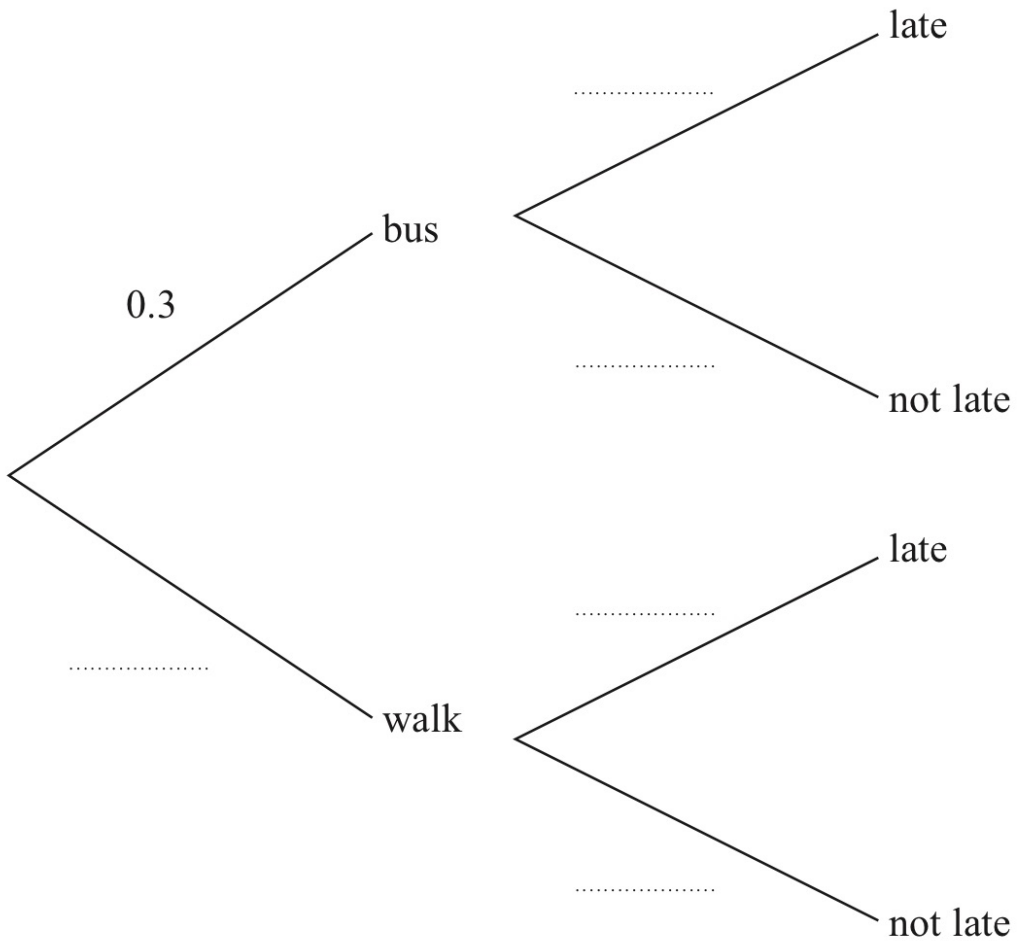


(2)

20.

Barney will go to college on 200 days next year.

(b) Work out an estimate for the number of days Barney will be late for college next year.



.....

(4)

TOPMaths A* Level

21.

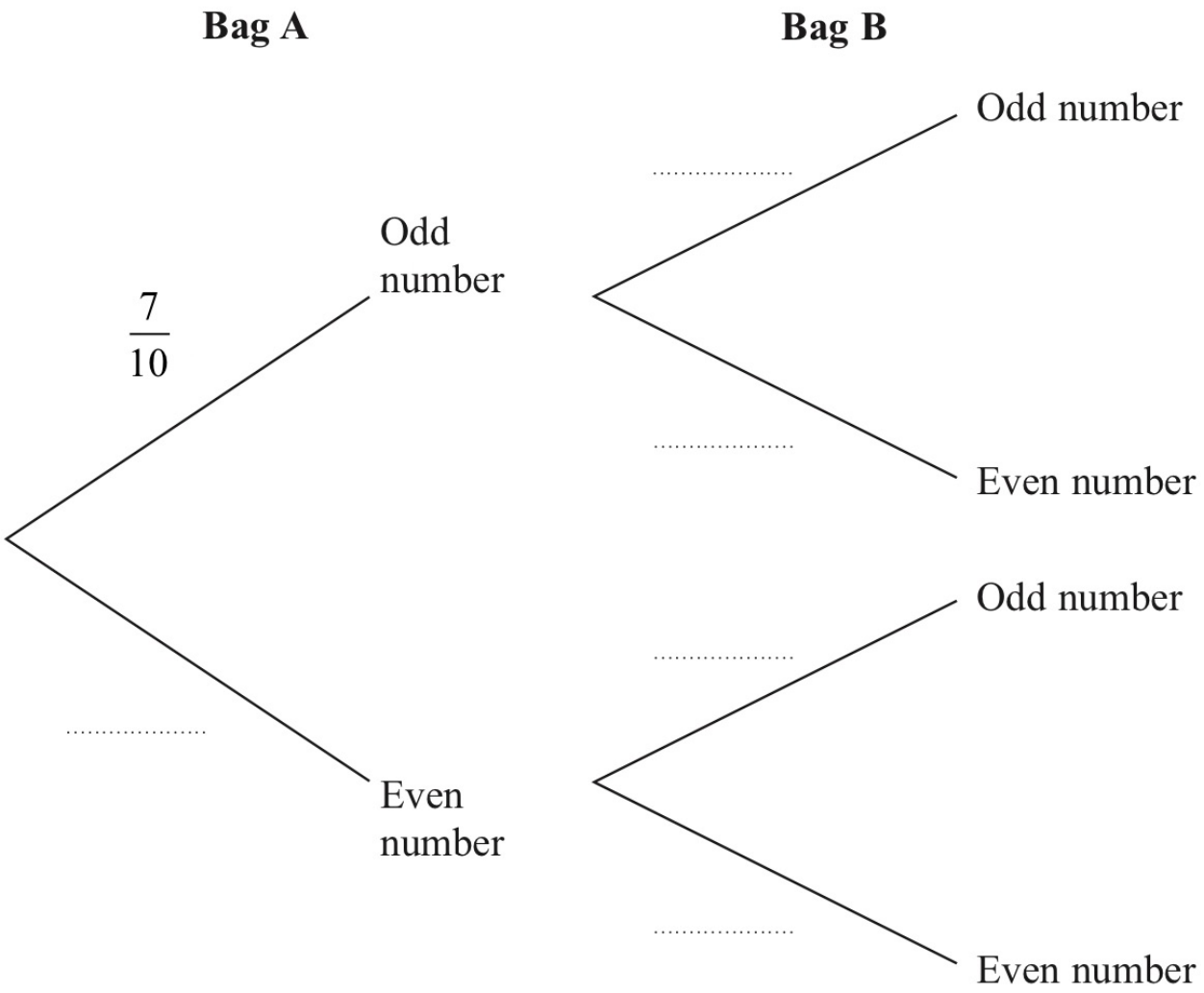
Cody has two bags of counters, bag **A** and bag **B**.

Each of the counters has either an odd number or an even number written on it.

There are 10 counters in bag **A** and 7 of these counters have an **odd** number written on them.
There are 12 counters in bag **B** and 7 of these counters have an **odd** number written on them.

Cody is going to take at random a counter from bag **A** and a counter from bag **B**.

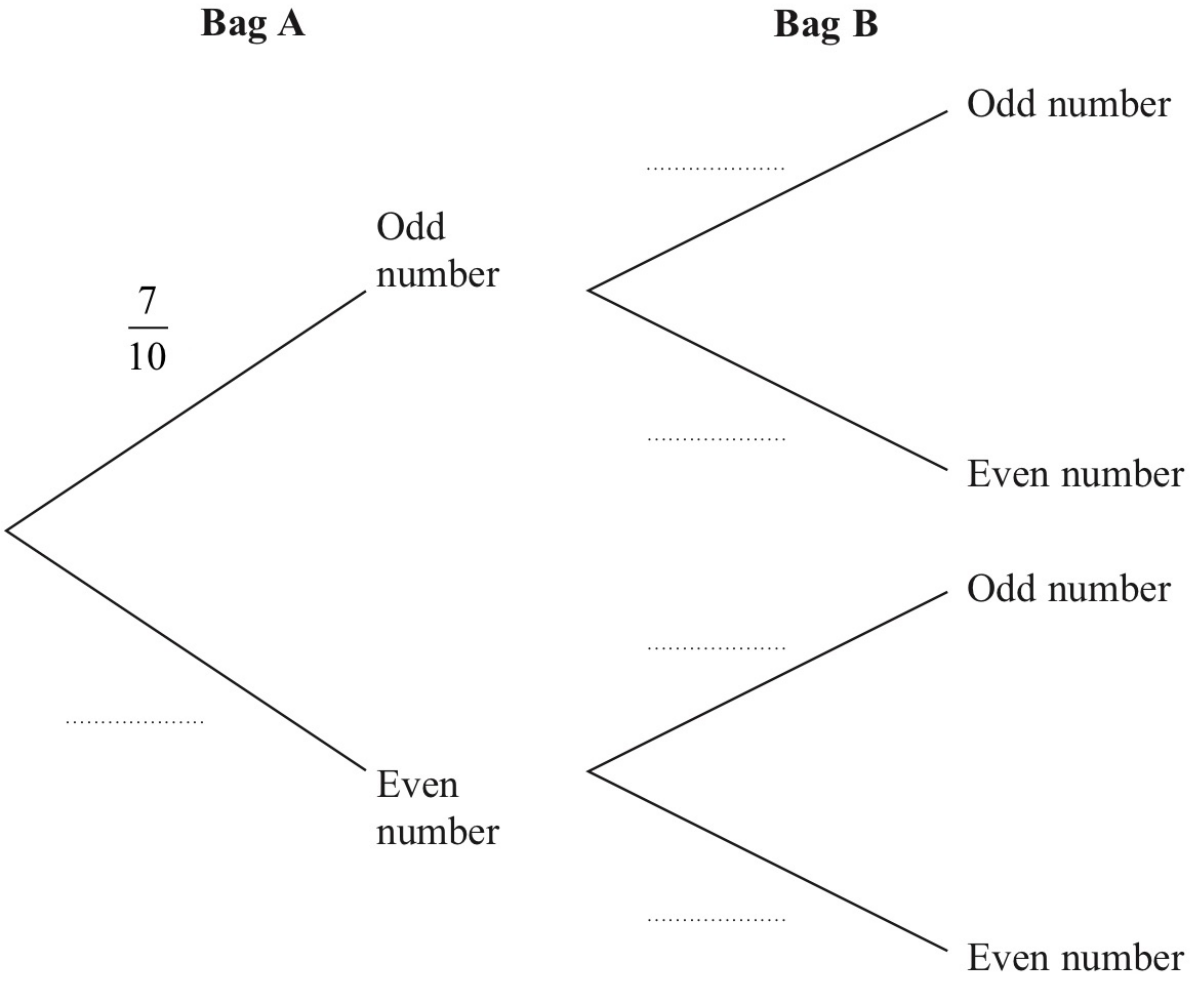
(a) Complete the probability tree diagram.



(2)

21.

(b) Calculate the probability that the total of the numbers on the two counters will be an odd number.



.....

(3)

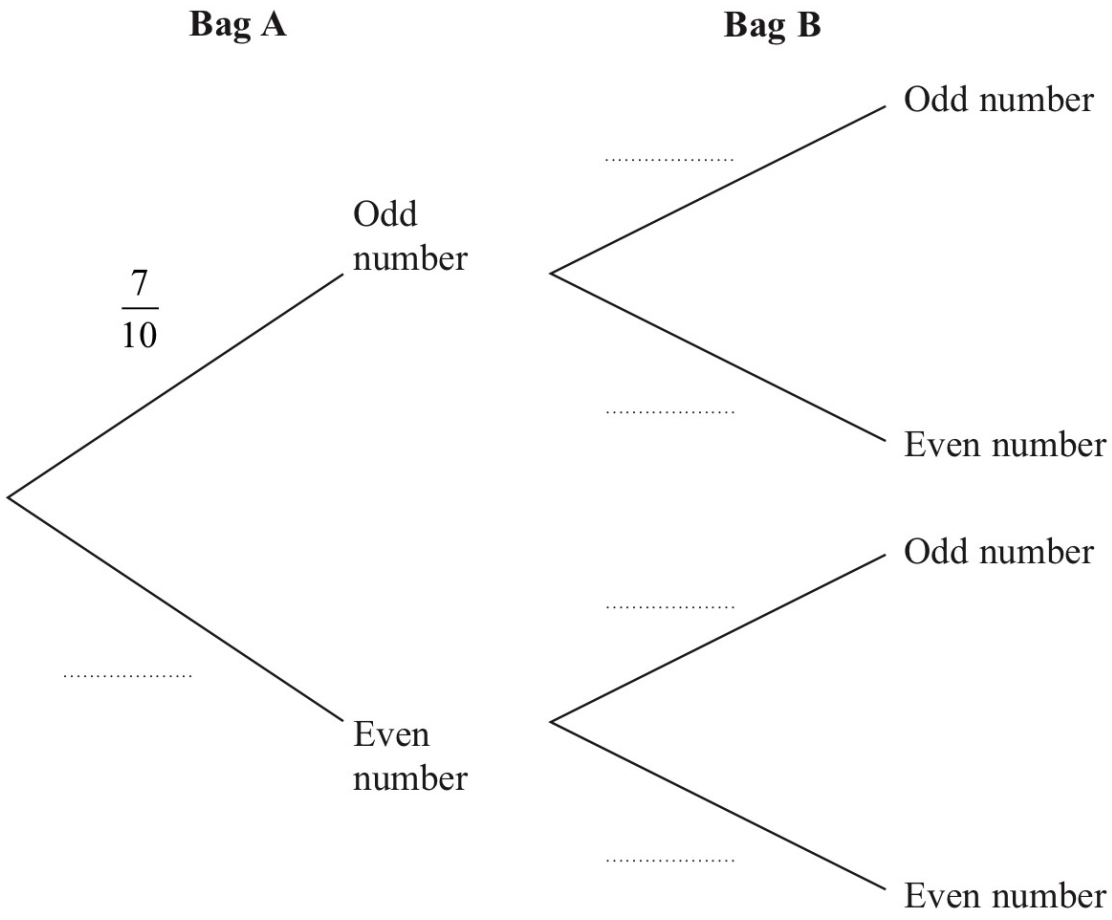
21.

Harriet also has a bag of counters.
Each of her counters also has either an odd number or an even number written on it.

Harriet is going to take at random a counter from her bag of counters.

The probability that the number on each of Cody's two counters **and** the number on Harriet's counter will all be even is $\frac{3}{100}$

(c) Find the least number of counters that Harriet has in her bag.
Show your working clearly.



.....

(3)

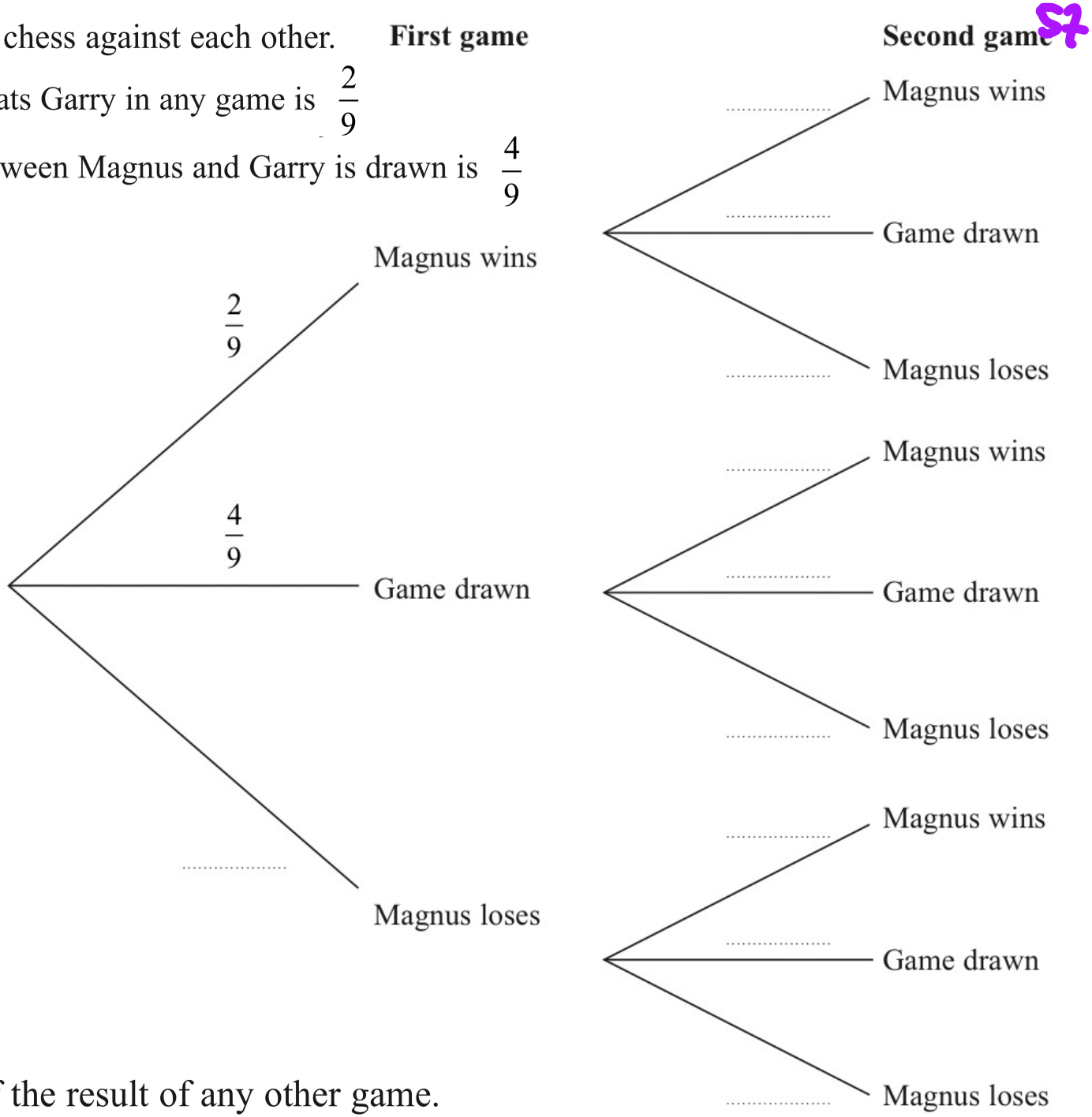
TOPMaths
A* Level

22.

Magnus and Garry play 2 games of chess against each other.

The probability that Magnus beats Garry in any game is $\frac{2}{9}$

The probability that any game between Magnus and Garry is drawn is $\frac{4}{9}$



The result of any game is independent of the result of any other game.

(a) Complete the probability tree diagram.

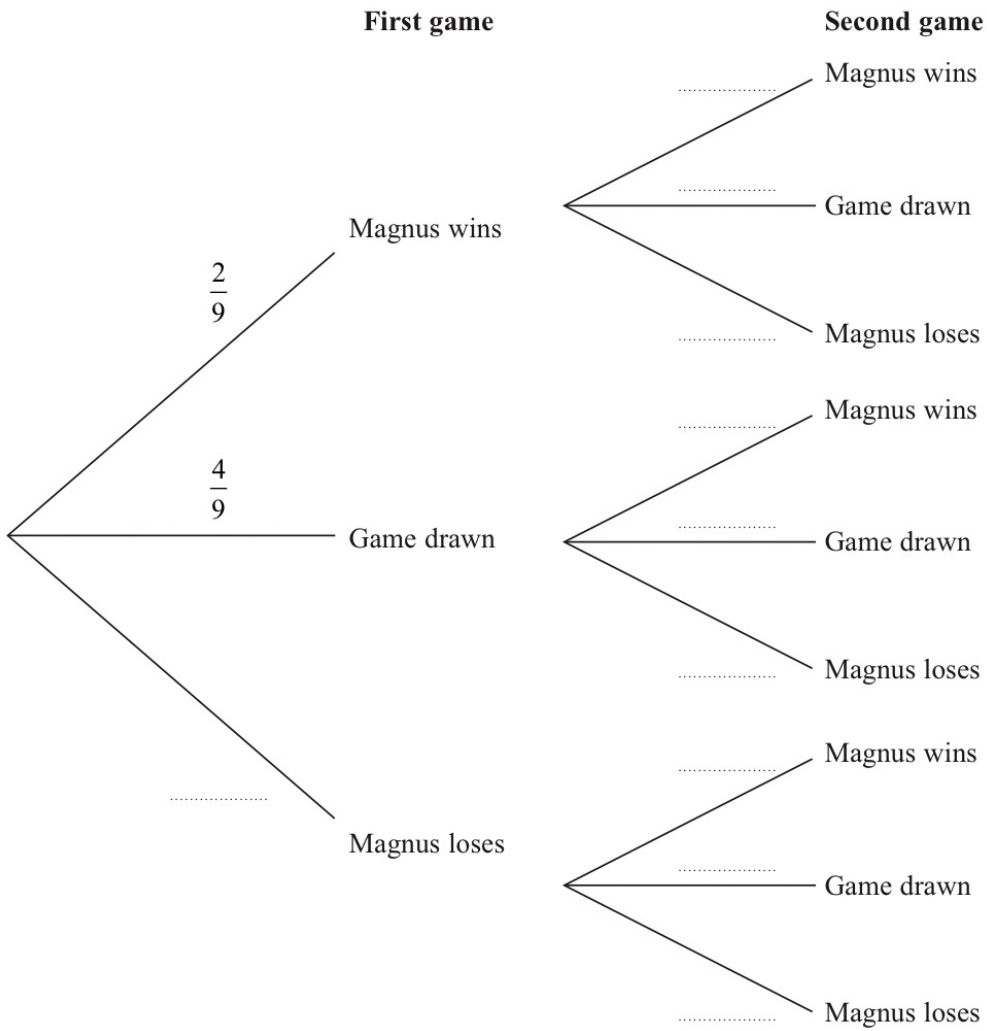
(2)

22.

For each game of chess,

the winner gets 2 points and the loser gets 0 points,
when the game is drawn, each player gets 1 point.

(b) Work out the probability that, after 2 games, Magnus and Garry have the same number of points.



.....

(3)

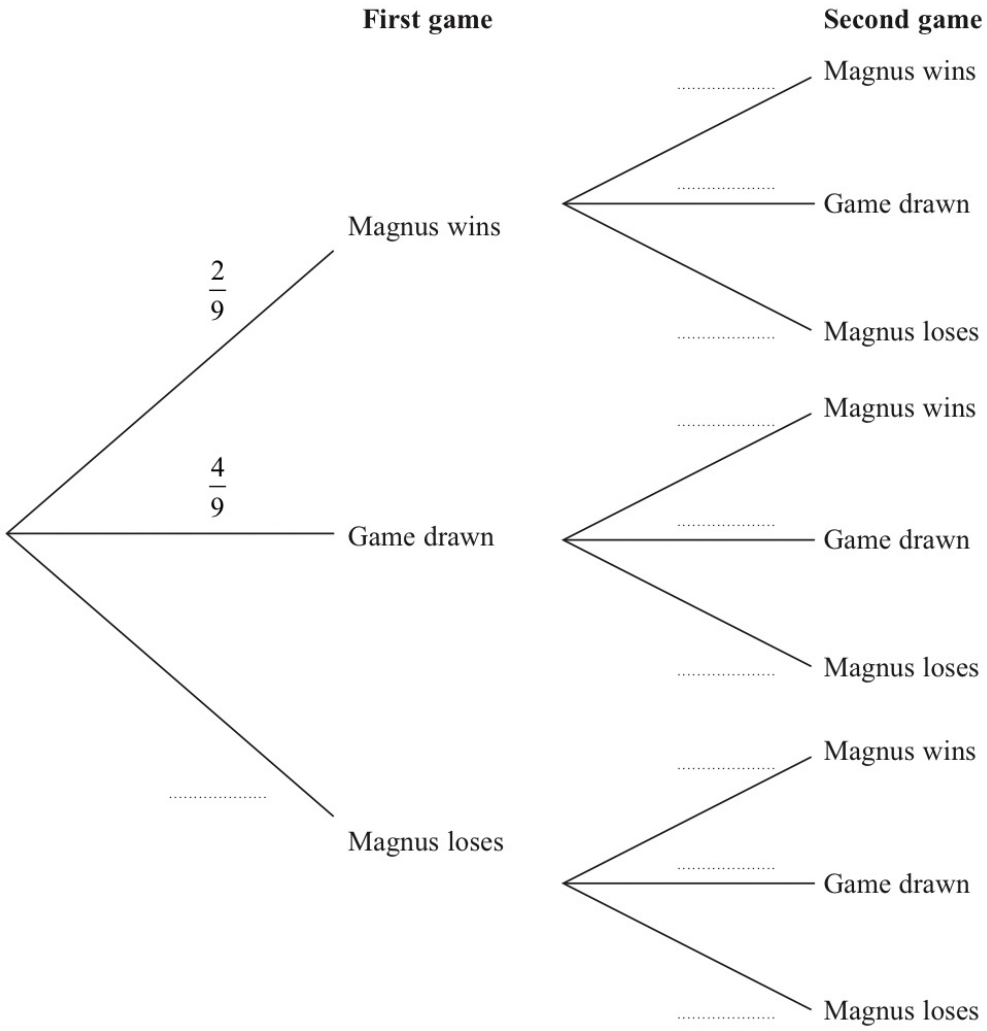
TOPMaths A* Level

22.

the winner gets 2 points and the loser gets 0 points,
when the game is drawn, each player gets 1 point.

Magnus and Garry now play a third game of chess.

(c) Work out the probability that, after 3 games, Magnus and Garry have the same number of points.



.....

(3)

TOPMaths A* Level

23. Here are 9 cards. Each card has either a number on it or a letter on it.

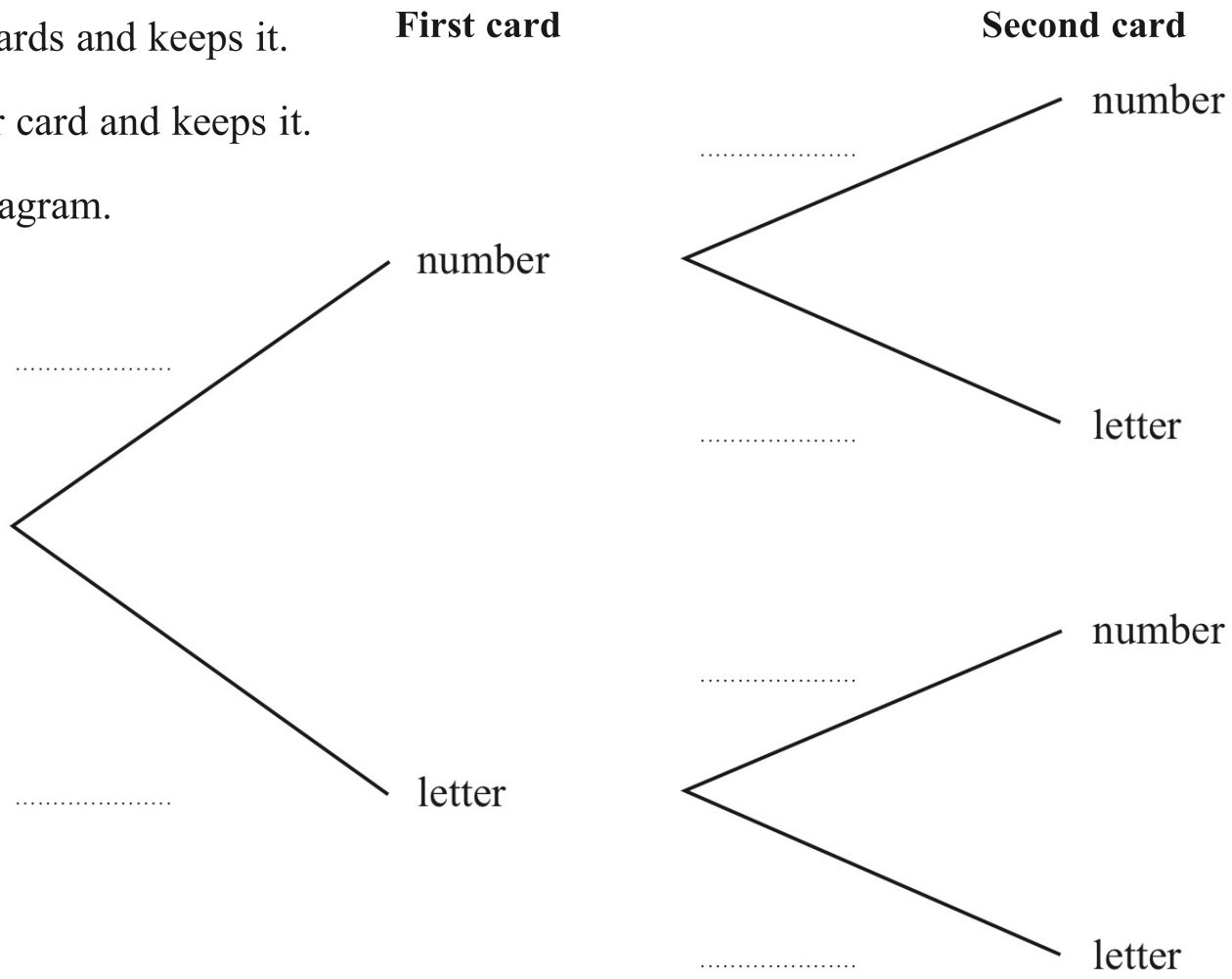
A	7	H	F	E	D	G	5	C

Tomas is playing a game.

Tomas takes at random one of the cards and keeps it.

Tomas then takes at random another card and keeps it.

(a) Complete the probability tree diagram.

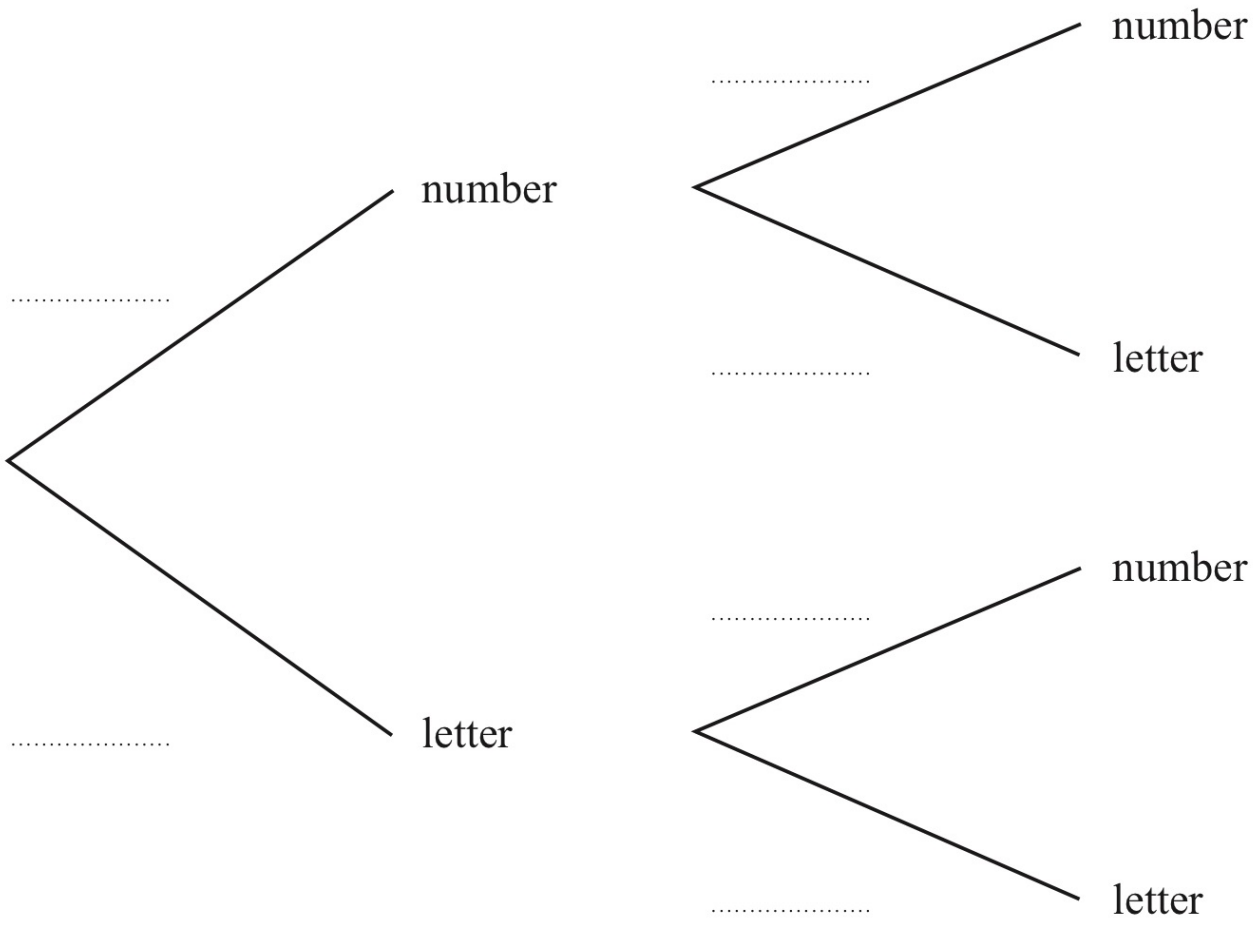


(2)

TOPMaths
A* Level

23.

(b) Work out the probability that each of the two cards has a number on it.



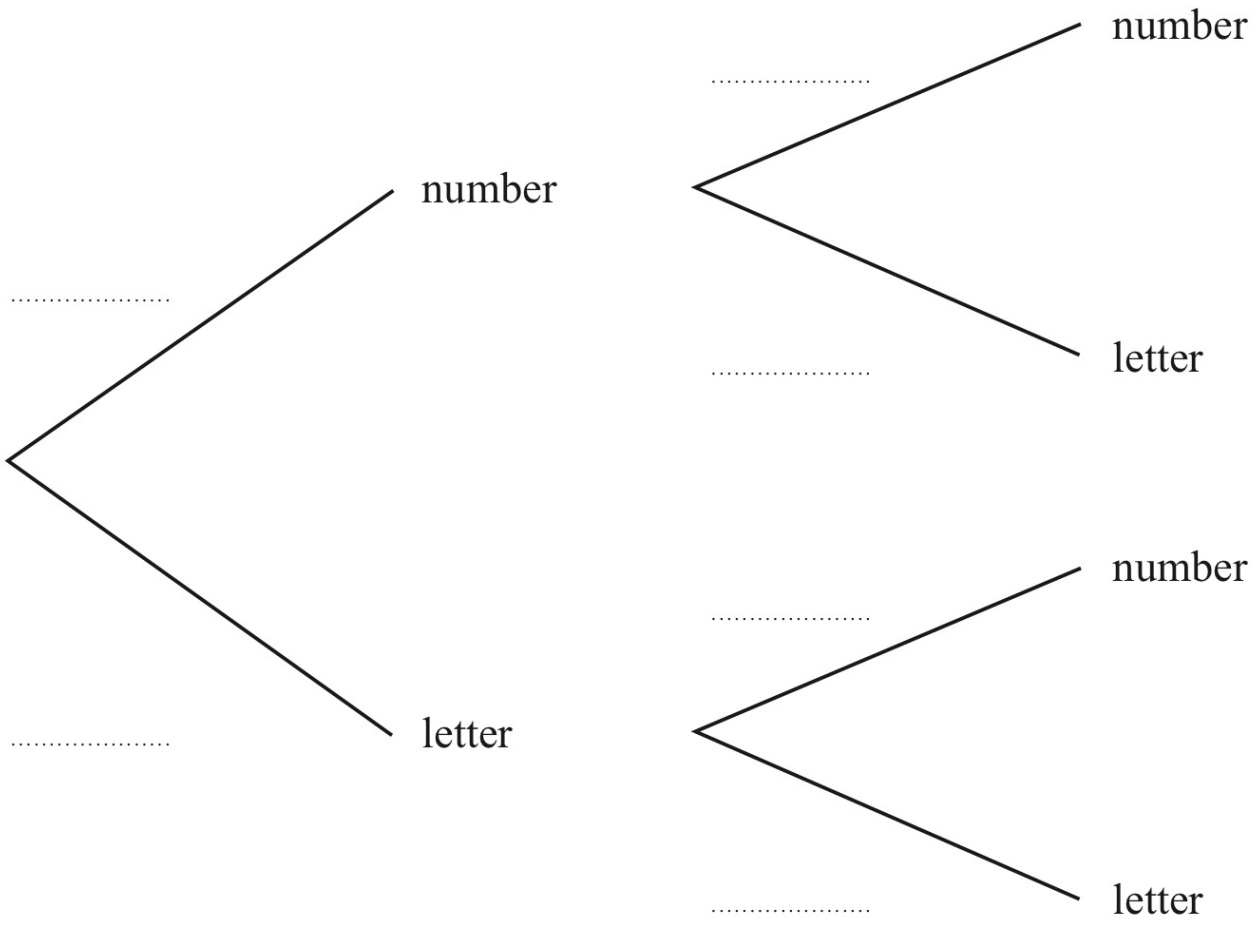
.....

(2)

TOPMaths
A* Level

23.

(c) Work out the probability that there will be one card with a number on it and one card with a letter on it.



.....

(3)

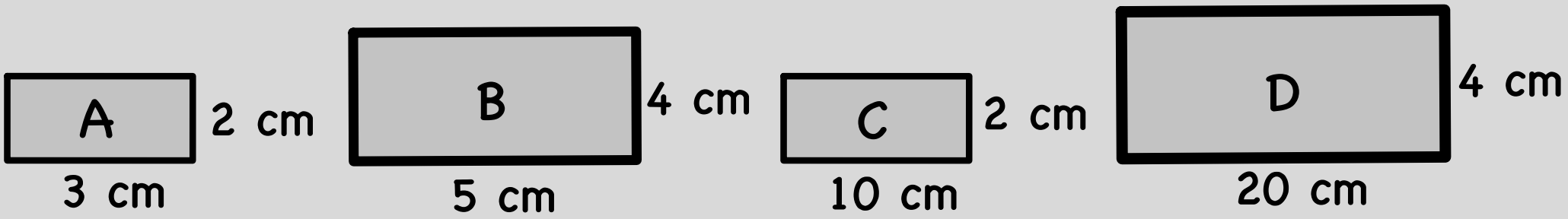
MATHS ONLINE

By: Kru Tar

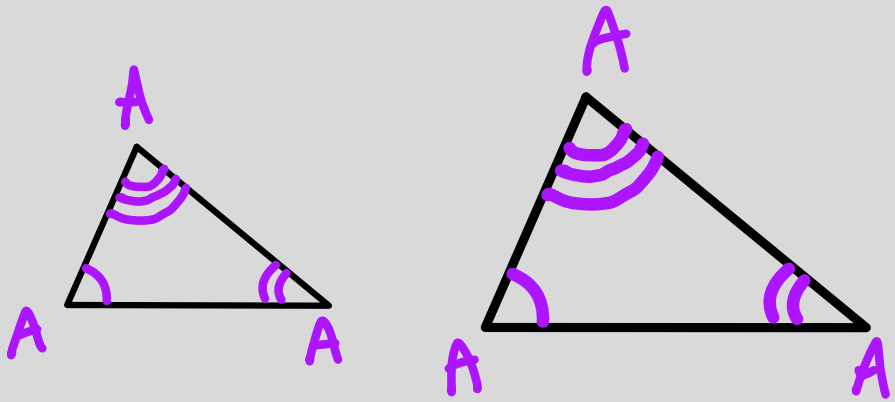
4.6 Similarity

Same shape. Corresponding sides are in proportion.

✓ Enlargement



Similar triangles ➡ AAA



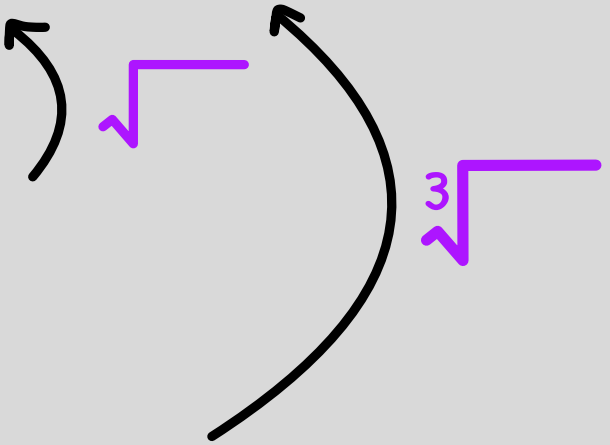
MATHS ONLINE

By: Kru Tar

4.6 Similarity

Scale factor

Length	$a : b$	$\times k$
Area	$a^2 : b^2$	$\times k^2$
Volume	$a^3 : b^3$	$\times k^3$



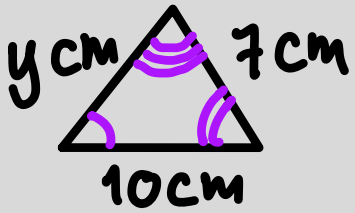
MATHS ONLINE

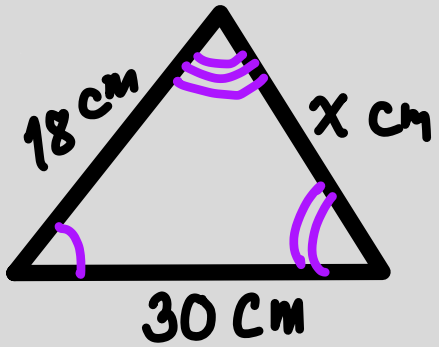
By: Kru Tar

4.6 Similarity

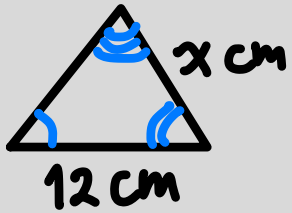
Length	a : b	x k

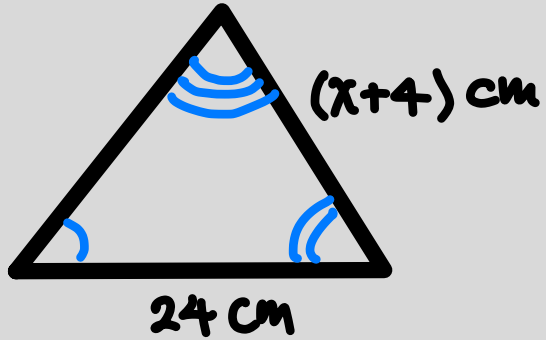
Ex.





Ex.





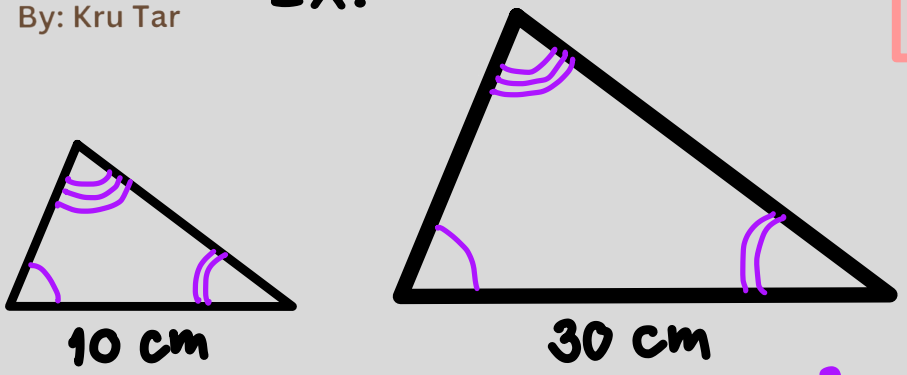
MATHS ONLINE

By: Kru Tar

4.6 Similarity

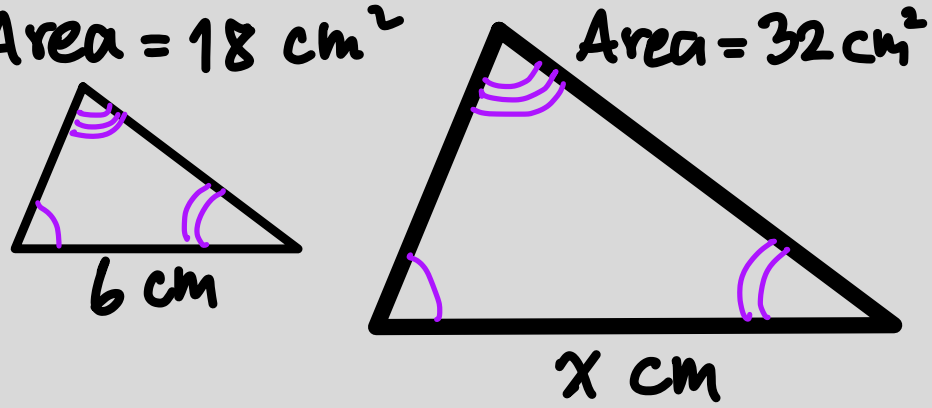
Length	a : b	x k
Area	$a^2 : b^2$	x k^2

Ex.



Area = 9 cm^2 Area = x cm^2

Ex.



MATHS ONLINE

By: Kru Tar

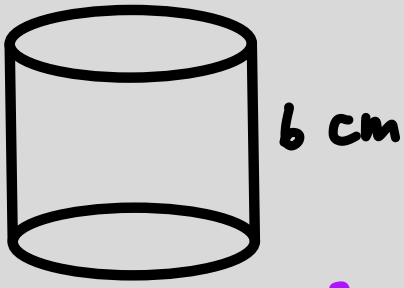
4.6 Similarity

Length	$a : b$	$\times k$
Volume	$a^3 : b^3$	$\times k^3$

$\sqrt[3]{\ }$

Ex.

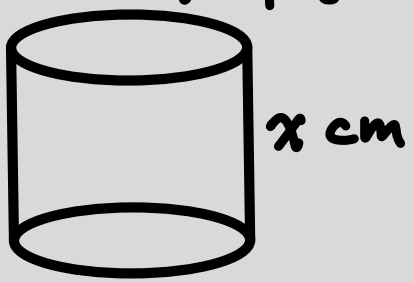
$V = 30\ cm^3$



$V = x\ cm^3$

Ex. $V = 32\ cm^3$

$V = 108\ cm^3$

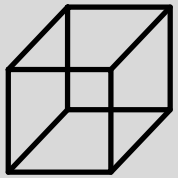


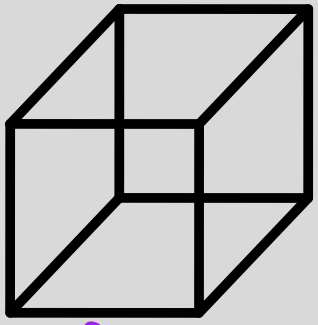
MATHS ONLINE

By: Kru Tar

4.6 Similarity

Ex.





Surface Area = 9 cm^2

Surface area = 16 cm^2

Volume = 81 cm^3

Volume = x cm^3

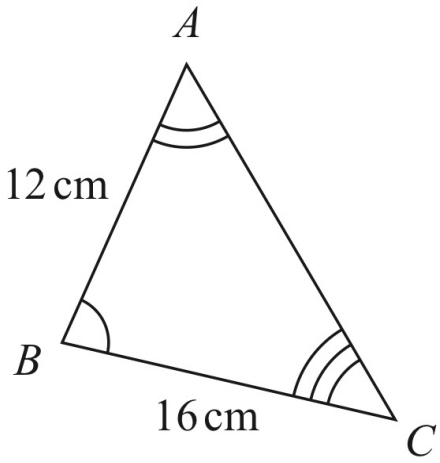
Length	a : b	x k
Area	a^2 : b^2	x k^2
Volume	a^3 : b^3	x k^3

4.6 Similarity

TOPMaths
A* Level

24.

ABC and *DEF* are similar triangles.



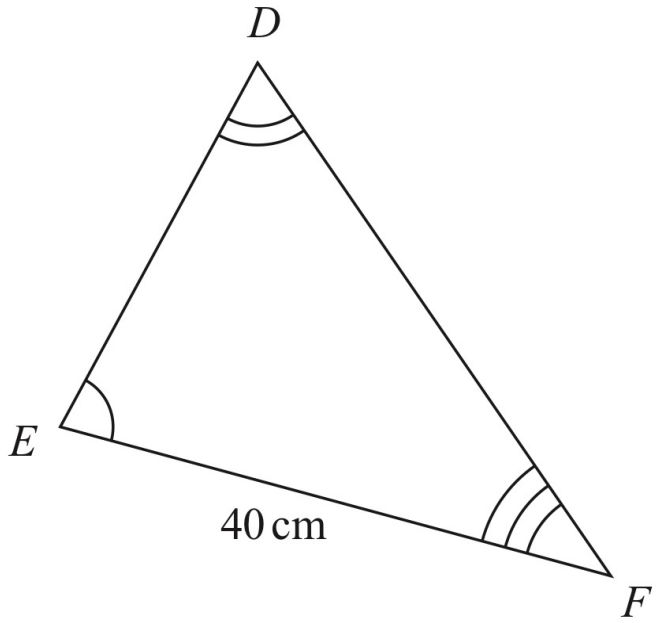


Diagram **NOT** accurately drawn

(a) Work out the length of *DE*.

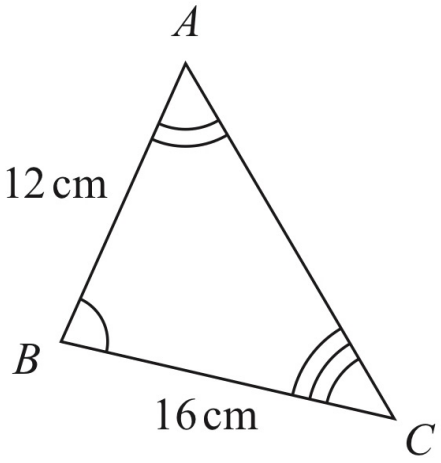
..... cm

(2)

TOPMaths A* Level

24.

ABC and *DEF* are similar triangles.



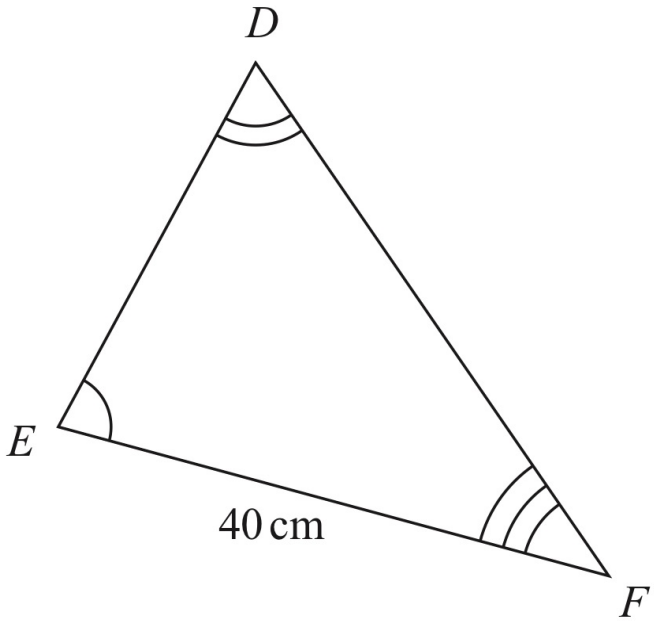


Diagram **NOT** accurately drawn

The area of triangle *DEF* is 525 cm^2

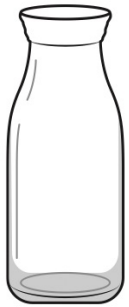
(b) Find the area of triangle *DEF* in m^2

..... m^2

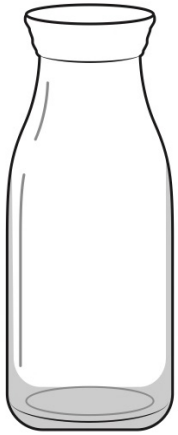
(2)

TOPMaths
A* Level
25.

The diagram shows two similar bottles, **A** and **B**.



A



B

Diagram **NOT** accurately drawn

Bottle **A** has surface area 240 cm^2
Bottle **B** has surface area 540 cm^2 and volume 2025 cm^3

Work out the volume of bottle **A**.

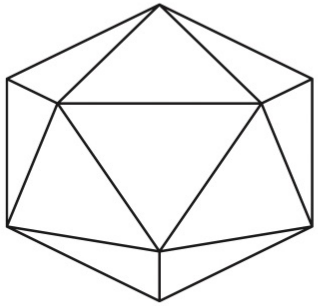
..... cm^3

(Total for Question 21 is 3 marks)

TOPMaths
A* Level

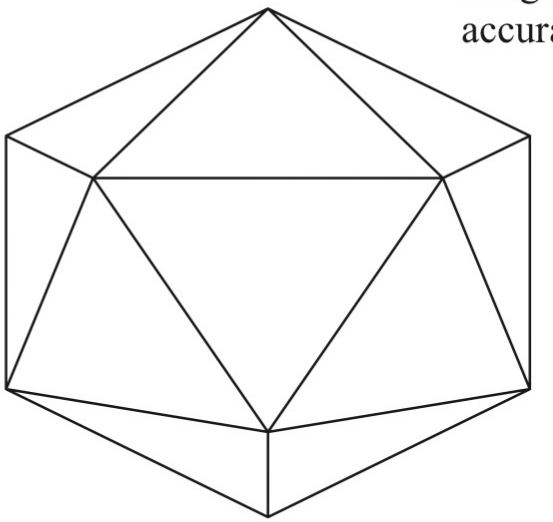
26.

A and **B** are two similar solids.



A

Diagram **NOT** accurately drawn



B

A has a volume of 1836 cm^3
B has a volume of 4352 cm^3

B has a total surface area of 1120 cm^2

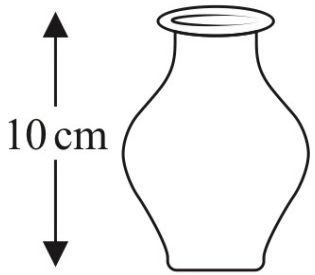
Work out the total surface area of **A**.

..... cm^2

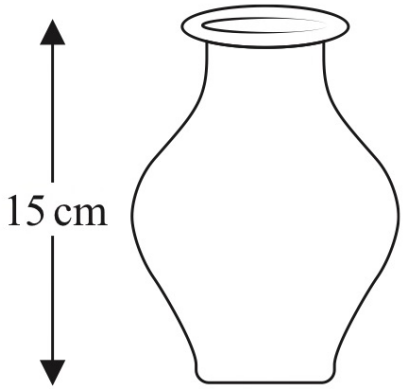
(Total for Question 20 is 3 marks)

27.

A and **B** are two similar vases.



A



B

Diagram **NOT** accurately drawn

Vase **A** has height 10 cm.
Vase **B** has height 15 cm.

The difference between the volume of vase **A** and the volume of vase **B** is 1197 cm^3

Calculate the volume of vase **A**

..... cm^3

(Total for Question 17 is 4 marks)

TOPMaths
A* Level

28.

The three solids **A**, **B** and **C** are similar such that

the surface area of **A** : the surface area of **B** = 4 : 9

and

the volume of **B** : the volume of **C** = 125 : 343

Work out the ratio

the height of **A** : the height of **C**

Give your ratio in its simplest form.

.....

(Total for Question 18 is 4 marks)

TOPMaths
A* Level

29.

The surface area of sphere **A** is nine times the surface area of sphere **B**
The difference between the volume of sphere **A** and the volume of sphere **B** is 117π cm^3

Find the radius of the smaller sphere.
Show your working clearly.

..... cm

(Total for Question 24 is 5 marks)