Surname	
Other Names	
Candidate's Signature	

GCSE 9 - 1 Questions

Combined Probability

Calculator Allowed

INSTRUCTIONS TO CANDIDATES

Write your name in the space provided.

Write your answers in the spaces provided in this question paper.

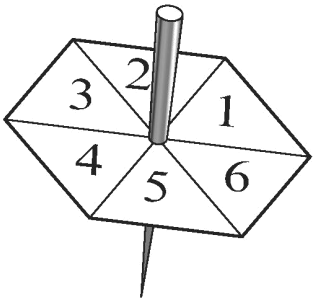
Answer ALL questions.

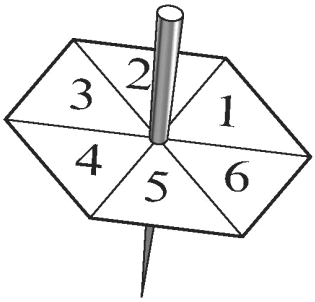
Any working should be clearly shown in the spaces provided since marks may be awarded for partially correct solutions.

You should have a ruler, compass and protractor where required.

Total Marks :

1) The following two spinners are spun.





Kevin adds together the two numbers obtained to get a total score.
The table below shows some of the possible total scores.

Second spinner						
6	7	.....	.....	.....	.....	.....
5	6	.....	.....	.....	.....	.....
4	5	6	.....	.....	.....	.....
3	4	5	.....	.....	.....	.....
2	3	4	5	6	7	.....
1	2	3	4	5	6	7
	1	2	3	4	5	6

First spinner

(a) Complete the table to show **all** the possible total scores.

[2]

(b) What is the probability of getting a total score of 9?

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[2]

(c) If Kevin spins the two spinners 180 times, how many times would he expect to get a total score of 9?

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[2]

2) There are four balls numbered 2, 2, 3 and 4 respectively in machine A and four balls numbered 3, 4, 5 and 6 respectively in machine B.
In a game, both machines A and B select one ball at random.
The score for the game is the 2-digit number whose units digit is the number from machine A and whose tens digit is the number from machine B.

For example, if the number on the ball from machine A is 4 and the number on the ball from machine B is 3, the score is 34.

(a) Complete the following table to show all the possible scores. [2]

Machine B \ Machine A	2	2	3	4
6	62	.....	63	.....
5	52	.....	.....	54
4	42	42	.....	44
3	32	32	33	.....

A player wins a prize by getting a score of 42 or less.

A player wins a prize by getting a score of 42 or less.

(b) (i) Matthew plays the game once. What is the probability that he wins a prize? [2]

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(ii) One day 400 people play this game once. Approximately how many would you expect to win a prize? [2]

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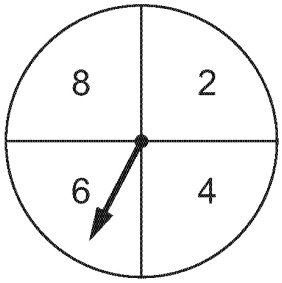
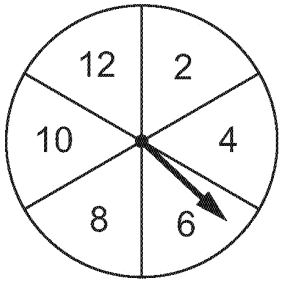
3) Katrina and George have made two spinners for their stall in the school fair.
They need to work out some probabilities to help decide how to give out the prizes.

Diagrams of their spinners are shown below.





Each person who takes a turn at the stall must spin both spinners.
The two scores are **added** together to give the total score.

Find the probability that the total score for any person is 20. [3]

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4) Megan is playing a game against Ian.

They each have a bag containing three cards.

Megan's cards are numbered 5, 7 and 9.

Ian's cards are numbered 2, 4 and 6.

Megan chooses a card at random from her own bag and then a card at random from Ian's bag.

Megan works out the product of the two numbers and adds 3 to her answer.

This total is Megan's score.

For example, if Megan picks a 5 from her own bag and a 2 from Ian's bag, her score will be $5 \times 2 + 3 = 13$.

(a) Complete the following table, showing all of Megan's possible scores. [2]

		Ian's bag		
		2	4	6
Megan's bag	5	13		
	7			45
	9			

(b) Find the probability that Megan's score is less than 30. [2]

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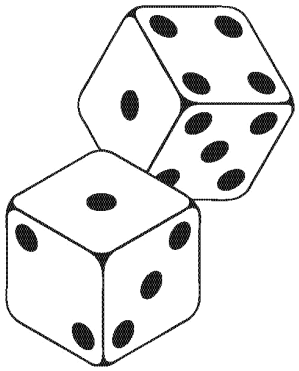
5) Two fair dice are thrown.



The two numbers obtained are multiplied together to get the total score.
The table below shows some of the possible total scores.

Second dice							
	6	6	.....	.....	.....	.....	.....
	5	5	.....	.....	.....	.....	.....
	4	4	8	.....	.....	.....	.....
	3	3	6	.....	.....	.....	.....
	2	2	4	6	8	10	.....
	1	1	2	3	4	5	6
		1	2	3	4	5	6

First dice

(a) Complete the table to show all the possible total scores. [2]

(b) What is the probability of getting a total score of 20 or more?

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[2]

(c) If the two dice are thrown 720 times, how many times would you expect to get a total score of 20 or more?

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[2]

6) A red bag contains four cards numbered 2, 3, 4 and 5 respectively. A green bag contains four cards numbered 2, 4, 5 and 6 respectively. In a game, a player takes one card at random from each of the two bags. The score for the game is the product of the two numbers on the cards.

a) Using the grid below, complete the table to show all the possible scores. Some entries have been done for you.

Green bag

5		15		
4				
		3		

Red bag

[3]

b) Find the probability that the score is

i. 15 or less

[2]

ii. 16 or more

[1]

7) A bag contains four balls numbered 1, 3, 5 and 7 respectively.
A box contains four discs, one coloured red, one blue, one green and one yellow.
In a game, a player takes one ball at random from the bag and one disc at random from the box.
If the colour of the disc is red or blue, the score for the game is 3 times the number on the ball.
If the colour of the disc is green or yellow, the score for the game is just the number on the ball.

(a) Using the grid below, complete the table to show all the possible scores.
Some entries have been done for you.

Box \ Bag				
green				
red	3		15	
	1		5	

[3]

(b) Find the probability that the score is

(i) 9 or more,

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[2]

(ii) less than 9.

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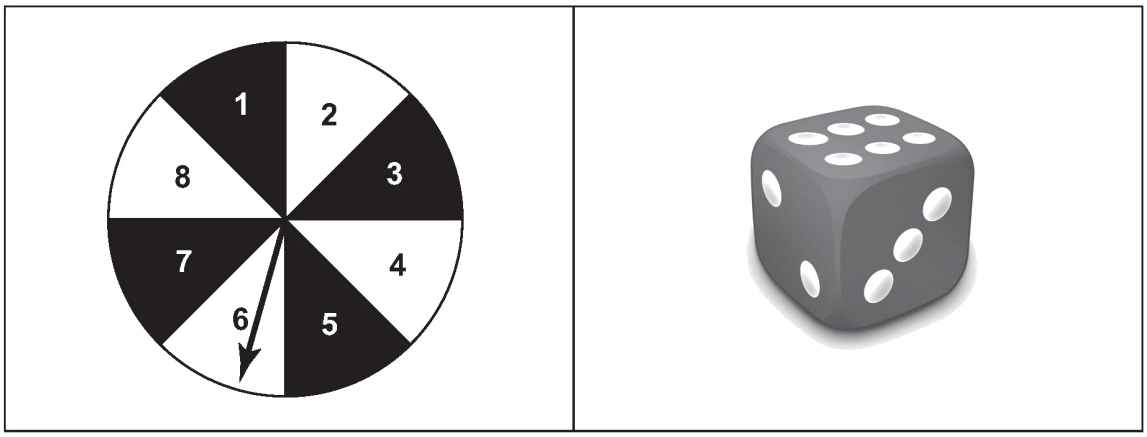
[1]

8) Graham is thinking of setting up a 'spinner and dice stall' at his school's open evening to raise funds for a trip.
He needs to know some probabilities so that he can decide on the prizes.

He intends to spin the spinner and throw the dice shown below at the same time.



The score on the spinner is added to the score on the dice to obtain the total score.

(a) Find the probability that the total score will be 14.

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[3]

(b) Write down the probability that the total score will be less than 15.

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[1]

9) Elin has two bags containing coloured balls.

The first bag contains only red and green balls.
The second bag contains only yellow and purple balls.

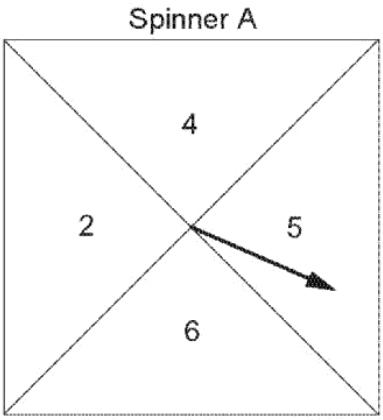
Elin chooses one ball at random from each bag.
The probability that she chooses a red ball from the first bag is 0·8.
The probability that she chooses a yellow ball from the second bag is 0·3.

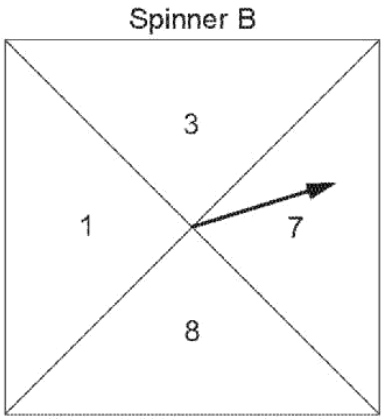
What is the probability that Elin chooses a green ball and a purple ball? [3]

10) Sanej throws two fair dice.
He scores a double one.

Calculate the probability of **not** scoring a double one when two fair dice are thrown. [2]

11)
Amira is playing a game with two fair spinners.
The faces of the spinners are shown below.





The numbers on Spinner A are 2, 4, 5, 6.

The numbers on Spinner B are 1, 3, 7, 8.

Amira spins Spinner A and then she spins Spinner B.
She works out her score by **multiplying the number on Spinner A by 3 and adding the answer to the number on Spinner B**.
For example, if the number on Spinner A is 5 and the number on Spinner B is 7, then Amira's score would be $(3 \times 5) + 7 = 22$.

(a) Complete the table below to show all Amira's possible scores. [2]

Spinner A \ Spinner B	1	3	7	8
2	7		13	
4		15		20
5	16		22	
6		21		26

(b) Find the probability that Amira's score is less than 15. [2]

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12)
As part of a competition twenty tickets are placed in a hat.
The tickets are numbered from 1 to 20.
Anna is going to pick out two tickets.

(a) If the rule for winning a prize is

'numbers that are multiples of six win a prize',

calculate the probability that Anna picks out two winning tickets.

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[4]

(b) If the rule for winning a prize is

'numbers that are factors of eighteen win a prize',

calculate the probability that Anna picks out at least one winning ticket.

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[4]

13)

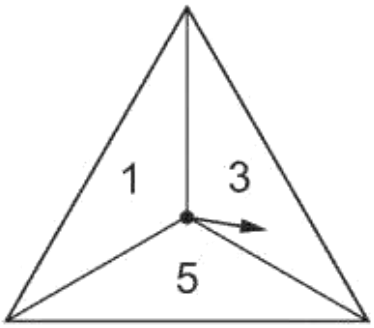
(a) Karen has 12 cards.
4 are yellow, 4 are red and 4 are blue.
The 4 yellow cards are numbered 1, 2, 3 and 4. Similarly, the 4 red cards and the 4 blue cards are numbered 1, 2, 3 and 4.
The 12 cards are all put in a bag and one card is drawn out of the bag at random.
Write down all the possible outcomes. One has been done for you. [2]

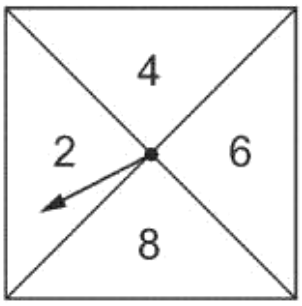
Yellow, 1

(b) (i) In a game, a player selects a card at random from the bag.
The player wins a prize if the selected card is a red card with an even number on it.
What is the probability that the player wins a prize? [2]

(ii) One day 120 people play this game once. How many people would you expect to win a prize? [2]

14) Nia has made up a game using two fair spinners. The faces of the spinners are shown below.





The first spinner is an equilateral triangle, with sections numbered 1, 3 and 5.

The second spinner is a square, with sections numbered 2, 4, 6 and 8.

Nia spins the triangular spinner first and then she spins the square spinner.

Her score is a two-digit number. The first digit is the number on the triangular spinner and the second digit is the number on the square spinner.

(a) Nia writes down all the possible scores she could obtain.
Some are done for you.
Complete the list of **all** the possible two-digit numbers she could get. [2]

12 14 16 18

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(b) (i) Write down the probability that Nia gets a score that is greater than 37. [2]

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(ii) Write down the probability that Nia gets a score that is less than 70. [1]

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(c) Nia says that she will always get even numbers for her results.
Is she correct? You must give a reason for your answer. [1]

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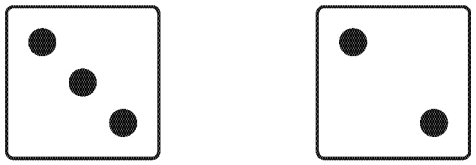
15) *You will be assessed on the quality of your written communication in this question.*



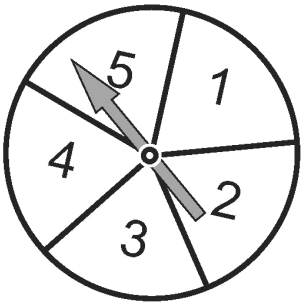
Megan throws two fair six-sided dice.
The score is the **sum** of the 2 numbers shown on the dice.
In this example the score is 5, as 3 + 2 = 5.

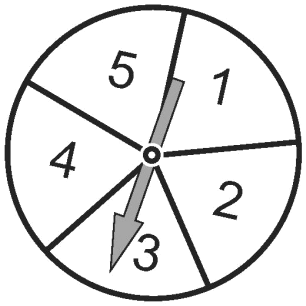
By showing all the possible outcomes, find

- the probability of obtaining a total of 7,
- the probability of obtaining a total greater than 10,
- the probability of obtaining a total that is a square number.

You must show all your working. [7]

16)





The two spinners are spun.
The score is the total of the two numbers shown on the spinners.
The score shown above is eight.

There are two different game cards, card A and card B.
A game is played, crossing out the scores from the spinners on the game card as the spinners are spun repeatedly.
The first game card with all four scores crossed out is the winning card.

Game card A

3	2
9	10

Game card B

4	6
5	7

Which game card is more likely to be the winning card?
You must show your working and give a reason for your answer. [4]

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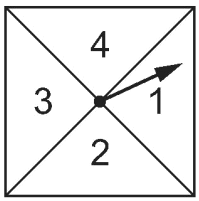
17)

(a) Gareth is running a game stall at his school fete.
In his game, a player must flip a coin and spin a fair 4-sided spinner.
The sections of the spinner are labelled 1, 2, 3 and 4, as shown below.



(i) Write down all the possible outcomes.
One has been done for you. [2]

Head, 1

(ii) A player wins a prize if the coin lands on tails and the spinner shows the number 4.
Azi plays the game once.

What is the probability that Azi wins a prize? [2]

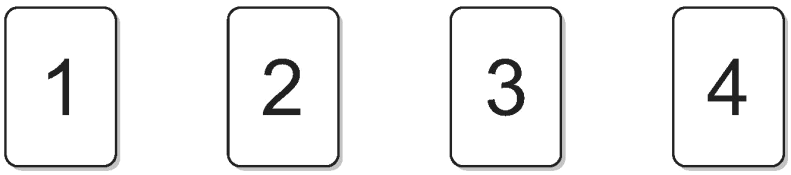
(b) Cerys says:

"The chance of throwing a three on an ordinary 6-sided dice is higher than the chance of throwing a six, because six is the hardest number to get."

Is Cerys correct?
Explain your reasoning fully. [1]

18) Three **red** cards have the following numbers written on them.

Four **green** cards have the following numbers written on them.



In a game, the cards are turned face down.
A player chooses one red card and one green card at random.
The player's score is the sum of the two numbers.

(a) Complete the following table. [1]

		Score		
Red card	9	.....	11	.....	.....
	6	.....	8	.....	.....
	3	4	5	6	7
		1	2	3	4

Green card

(b) A player wins a prize if the score is **more** than 9.
Safira plays the game once. What is the probability that she wins a prize? [2]

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(c) 60 people play the game once.
Approximately how many people would you expect to win a prize? [2]

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19)

(a) At a village fayre, a stall is raising money for charity using a game involving 2 bags of discs.

In each bag there are 5 discs.
In the 1st bag, the discs are numbered 1, 2, 3, 5 and 7.
In the 2nd bag, the discs are numbered 3, 4, 6, 8 and 9.

To play the game, one disc is selected at random from each bag.
The score for the game is the product of the numbers on the discs.

(i) Complete the following table to show all the possible scores. [2]

2nd bag \ 1st bag	1	2	3	5	7
9	9	18			
8	8	16			
6	6	12			
4	4	8	12	20	28
3	3	6	9	15	21

20) A fair dice and a fair coin are thrown once.

(a) Fill in the table below to show all the possible outcomes. [2]

	1	2	3	4	5	6
Head (H)	H1	H2				
Tail (T)	T1					

(b) Write down the probability of obtaining a head and a 4. [1]

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(c) Write down the probability of obtaining a tail and a number less than 3. [1]

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