

The 'Maths is ...' Jugglers

Knowledge

Skills

Understanding



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Sample Resources

from the

Teachers' Resource and Assessment Pack

for Y11 Ruff (GCSE Tier E-B)

The topic **"How Likely Is It ?"**

can be downloaded from the website

www.mathsisjugglers.com

**You have permission to print
this topic for use with your students.**

This pack contains the **Teachers' Resources and Assessments**
for the topic **"How Likely Is It ?"**
in the Y11 Ruff Guide.

You have permission to print these for use with your students.

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A list of items at Grade B in the Ruff Guides
can be downloaded from the website.
Students using this text and following the new
Foundation syllabus should omit these items.

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Ruff

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of the

Intermediate GCSE Course

THE RUFF GUIDE *Part 1 (Y10)*



ISBN-10: 1-874428-88-3
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SAMPLE

THE RUFF GUIDE *Part 2 (Y11)*



ISBN-10: 1-874428-89-1
ISBN-13: 978-1-874428-89-3

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SAMPLE

The emphasis here is on non-calculator skills, with a particular stress on mental agility. Many of the sections within the topics open with items that can be used as mental/oral starters and the techniques taught/reviewed here should be repeated regularly over the weeks following their introduction

The course should start with Topic 1. This contains the number techniques that will be assumed thereafter throughout the course. **The rest of the topics are independent and can be done in any order.** Any techniques required within a topic that are taught elsewhere, will be repeated at the point where they are required.



Order one **half price** copy of **Y10 Ruff** and **Y11 Ruff**
using the **Special Offer form**
which can be **downloaded**
from the **website**
www.mathsisjugglers.co.uk

Cross-Topic Information

The emphasis here is on non-calculator skills, with a particular stress on mental agility. Where applicable, sections within the topics open with items that can be used as mental/oral starters and the techniques taught/reviewed here should be repeated regularly over the weeks following their introduction.

Each lesson should start with a brief mental/oral starter. As well as developing mental arithmetic expertise, it provides a positive start to the lesson.

Suggestions for these are given on the topic pages that follow.

The aim is to develop a learning ethos where:

- mental techniques are a first resort
- pencil-and paper techniques are used routinely
- standard arithmetic techniques are used on a regular basis
- non-standard arithmetic techniques (jottings) are acceptable provided they are clearly shown
- calculators are used only when the calculations become complex
- calculator functions are understood and used effectively

Calculators to be used should have, as a minimum, the following functions:

+ - x ÷ x^2 \sqrt{x} memory brackets
 x^y or y^x $x^{1/y}$ or $x\sqrt{\quad}$ sin cos tan

Students who will take the Intermediate Tier at GCSE will have a wide spread of abilities. It is not expected that every student should do every exercise.

The better students will not need to do the easier exercises. For these students, a brief resumé of a technique, done as an oral starter, is all that is required.

The less able students are not expected to do the extension exercises – but they should be allowed to tackle them, if they feel able to do so.

The course should start with Topic 1. This topic contains the number techniques that will be assumed thereafter throughout the course.

The rest of the topics are independent and can be done in any order. Any techniques required within a topic that are taught elsewhere will be repeated at the point where they are required.



The Y10 and Y11 Ruff Guides deliver both the National Curriculum and the linear GCSE syllabuses for AQA, Edexcel and OCR.

However, the topics have been ordered in such a way as to make the material accessible to teachers and students following one of the modular GCSE syllabuses. To facilitate this, two of the topics are in both the Y10 text and the Y11 text. The topic contents of the whole course is listed on the contents page of both texts.

Topic 9: How Likely Is It ?

Printing List

None

Page in text

–

Pack page

–

In this topic students will review and extend probability techniques met in previous years.

By the end of the topic, each student should have a good grasp of probability theory and techniques.

Suggested mental/oral topics

Probability of equally likely outcomes	(D2.2, 2.3, 2.6)
The sum of probabilities is 1	(D2.5)
Multiplication of fractions (with and without cancelling)	(D6.2)
Multiplication of decimals	(D6.2)
<i>as well as</i>	
The mental arithmetic techniques met earlier in this course.	

Direct teaching points

All teaching points are in the text.

When students are referred to their teacher for answers

There are no teacher answers for this topic.

Miscellaneous word problems for use in mental/oral sessions

Exercise 1

1. List the numbers between 63 and 98 which are divisible by 5.
2. Double 45 + treble 7
3. Half of 15 + double 15
4. Paul has 6 red smarties, 3 blue smarties and 9 yellow smarties. He eats 5 smarties. How many does he have left ?
5. 4 twelves + 3 sixes
6. There are 31 days in October. What date will it be 12 days after 26th October ?
7. The world's first underground railway was opened in London in 1863. How many years ago was that ?
8. What is 27 less than 346 ?
9. There are 12 in a dozen. How many are there in $3\frac{1}{2}$ dozen ?
10. In old measurements, 1 stone = 14 pounds. How many pounds are there in 5 stones 4 pounds ?

Exercise 2

1. Double 17 and double $15\frac{1}{2}$
2. What is the smallest multiple of 9 above 85 ?
3. There are 7 players in a netball team. How many complete teams can be made from 61 players ?
4. In old measurements, there were 12 inches in 1 foot. How many inches are there in 3 feet 11 inches ?
5. Write 67 inches in feet and inches.
6. How many twentieths are there in two fifths ?
7. Oscar scored 57% in the text. Abdul scored 18% less than Oscar. Erroll scored 23% more than Abdul. What percentage mark did Erroll get ?
8. Grannie is 72. Mum is half as old as Grannie. Mary is half as old as Mum. How old is Mary ?
9. There are 347 boys and 329 girls in our school. How many students are there in the school ?
10. I had a piece of ribbon 4 m 35 cm long. I cut off two pieces, each 1 m 20 cm long. How long is the piece of ribbon that I have left ?

Exercise 3

1. The first public train service was between Stockton and Darlington. It opened in 1825. How many years ago was that.
2. A number squared is 196. What is the number ?
3. Zara was 27 years old in 1981. In what year was Zara born ?
4. The recipe calls for 8 ounces of icing sugar. Which packet should I buy : 100g, 200g or 300g ?
5. What do you add to 347 to make 420 ?
6. What fraction is halfway between $\frac{1}{5}$ and $\frac{1}{10}$?
7. 9×125
8. There are 12 marbles in a full box. How many boxes can I fill with 159 marbles ?
9. A pyramid of snooker balls has 1 in the top layer, 4 in the second layer and 9 in the third layer. How many balls are there in the fifth layer ?
10. Double 48 + half of 48

Exercise 4

1. What is the value of 2 to the power of 5 ?
2. There are 8 furlongs in one mile. In a 2 mile 5 furlong race, a jockey falls 7 furlongs from the finish. How far is he from the start ?
3. Yesterday 7 pupils in 11JY were absent. This is 20% of the tutor group. How many students are there in the tutor group ?
4. Tarporley is approximately 15 miles from Chester. How much is that approximately in kilometres ?
5. Sam was born in 1942. He will get a pension when he is 65. In what year will he first get his pension ?
6. In Scrabble, my score stands at 278. I then put down a word with a value of 16 points, which also earns a treble word score. What is my score after that ?
7. Work out the value of 6 cubed.
8. Before 1971, there were 12 pennies in one shilling and 20 shillings in one pound. How many pennies were there in one pound ?
9. The Mallard holds the world record speed for steam trains, 127 miles per hour. The record was set in 1938. How many years ago was that ?
10. What is 25 less than 462 ?

How Likely Is It ?

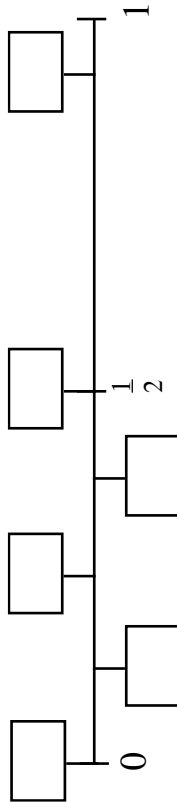
REVISION

Name :

Do the answers to this revision sheet in your exercise book or on paper – NOT ON THIS SHEET. Check your answers using the answers on the reverse of this sheet.

KEEP THIS SHEET SOMEWHERE SAFE.
USE IT AGAIN TO REVISE FOR EXAMS.

1. There are eight counters in a box.
One counter is taken out at random.



Copy this probability line.

- (a) Put each label into its correct box.

Red

White

Yellow

Green

Red or White

Red, Green or White

- (b) On your diagram, draw in a box for

Green or White

2. Is each set of outcomes equally likely (YES) or not equally likely (NO)

- (a) Toss a coin : outcomes are (head, tails)
 (b) Toss two coins : outcomes are (2 heads, 2 tails, one of each)
 (c) Toss two coins : outcomes are (HH, TT, HT, TH)
 (c) Drop a cup : outcomes are (cup breaks, cup does not break)

3. You choose a card from a pack of 52 cards.

- (a) What is the probability it is a red card ?
 (b) What is the probability it is a red queen ?
 (c) What is the probability it is a heart ?
 (d) What is the probability it is the queen of hearts ?

4. (a) What is the probability that tomorrow will be the 30th February ?
 (b) What is the probability that you will eat something today ?

5. Here are four ways of estimating probabilities:

O: use equally likely outcomes D: look at statistical data
 E: do an experiment to collect data S: do a survey to collect data

Which method would you use to estimate the probability ...

- (a) ... that Scotland will beat Wales in their next football match ?
 (b) ... that any Y11 boy chosen at random plays games on a computer at home ?
 (c) ... that you will get a six if you throw a dice.

6. List all possible equally likely outcomes if you toss two coins.

7. You buy two drinks from this drink machine.

Tea
Coffee
Cola

List all the possible combinations of drinks you could get.

8. Bag 1
2 white counters
1 black counter

Bag 2
1 red counter
2 black counters

A counter is taken from each bag.
The colour of each is recorded.

- (a) Copy and complete this table of possible outcomes:

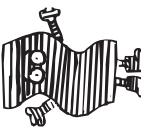
	Bag 1		
	W ₁	W ₂	B
R	RW	RW	RB
B ₁			
?			

Write down the probability of getting:

- (b) 2 black counters
 (c) at least one black counter
 (d) no black counters

9. Stripee sorted the sweets in his packet.

He had:
4 red sweets 15 green sweets
12 orange sweets 7 yellow sweets



- (a) Work out the relative frequency of each colour sweet.

Give your answers as fractions.

- (b) One sweet is chosen at random.

Work out the probability of it being a red sweet, to 3 d.p.

10. (a) Go shopping. Buy a new jacket. Are these events independent ?

(b) Wear glasses. Meet friends. Are these events independent ?

11.



One boy and one girl are chosen at random.

- (a) Work out the probability that Ann and Tony are chosen.
- (b) Work out the probability that Tony and anyone but Mary is chosen.

Section 6

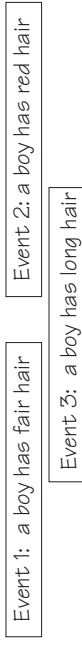
12.

A coin is tossed twice.

Work out the probability of getting two tails.

Section 6

13.



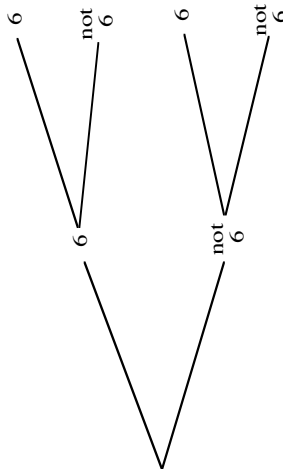
Which two of these events are mutually exclusive ?

Section 7

14.

A dice is tossed twice.

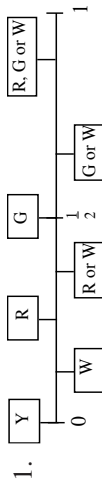
(a) Copy and complete this tree diagram for both events.



(b) Work out the probability of getting at least one six.

Section 8

ANSWERS



- 2. (a) YES (b) NO (c) YES (d) NO
- 3. (a) $\frac{1}{2}$ or $\frac{26}{52}$ (b) $\frac{2}{52}$ or $\frac{1}{26}$ (c) $\frac{13}{52}$ or $\frac{1}{4}$ (d) $\frac{1}{52}$

4. (a) 0 (b) 1

5. (a) D (b) S (c) O

6. HH, HT, TH, TT

7. (Tea, Tea) (Tea, Coffee) (Tea, Cola) (Coffee, Coffee) (Coffee, Cola) (Cola, Cola)

8. (a) $\frac{W_1 W_2 B}{R RW RW RB}$

$B_1 BW BW BB$

$B_2 BW BW BB$

(b) $\frac{2}{9}$ (c) $\frac{7}{9}$ (d) $\frac{2}{9}$

9. (a) red : $\frac{4}{38}$ green : $\frac{15}{38}$ orange : $\frac{12}{38}$ yellow : $\frac{7}{38}$
 (b) 0.105

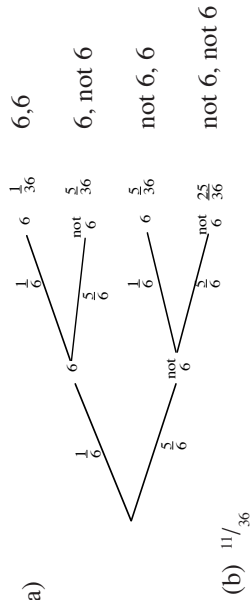
10. (a) NO (b) YES

11. (a) $\frac{1}{6}$ (b) $\frac{1}{3}$

12. $\frac{1}{4}$

13. Events 1 and 2

14. (a)



(b) $\frac{11}{36}$

How Likely Is It ? ASSESSMENT



Overall mark = %

Name :

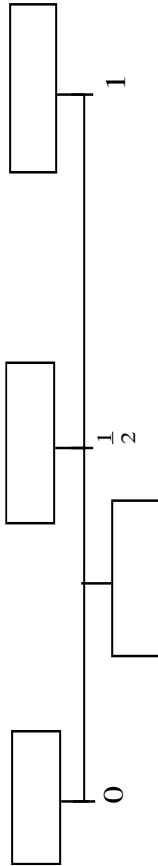
Write the answers on this sheet.

1.

Socks in a drawer
3 Black 2 White 1 Green

(5 marks)

One sock is taken out at random.



(a) Put each label into its correct box:

White (W) Black (B) Red (R) Black, White or Green (B, W or G)

(b) Draw in a box for

Black or White (B or W)

2. (a) A coin is tossed. The probability of getting a 'head' is

(b) You buy 3 raffle tickets. 100 tickets have been sold.

The probability of you winning first prize is

(c) A letter is chosen at random from the word BRILLIANT

The probability of getting an A is

The probability of getting an I or an L is

(d) A dice is thrown. The probability of getting a 7 is

3. Is each set of outcomes equally likely (YES) or not equally likely (NO) ? (4 marks)

- B B W : outcomes are (black, white)
- throw a dice : outcomes are (odd score, even score)
- throw a dice : outcomes are (6, not a 6)
- weather tomorrow : outcomes are (snow, no snow)

4. Here are three ways of estimating probabilities: (6 marks)

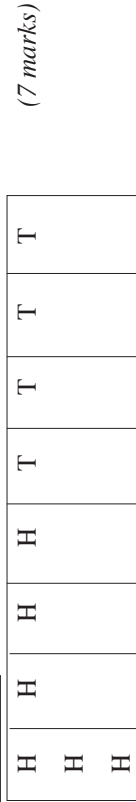
- A: look at equally likely outcomes B: look at statistical data
C: do an experiment or survey to collect data

Which method would you use to estimate the probability:

- (a) that there will be no rain during your summer holiday
- (b) that your raffle ticket will win first prize
- (c) that any student chosen at random from your class has chips for lunch today

5. 3 coins are tossed.

Complete this list of possible equally likely outcomes: (7 marks)

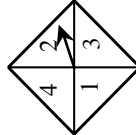


6.

T-shirts	Shorts
red	blue
green	grey

 Liz chooses a T-shirt and shorts. (3 marks)

List all the combinations of colours she could get.



7. The scores on this spinner are not equally likely. (8 marks)

In an experiment, the spinner is spun 400 times. The results are given in the table.

Complete the table:

Score	Frequency	Relative Frequency	Probability to 3 d.p.
1	165		
2	38		
3	98		
4	99		



This is a fair spinner. It is spun twice.
The result recorded is the SUM of the two scores.

(6 marks)

(a) Complete this table of scores:

4	5	...	...	8
3	4	...	...	...
2	3	...	...	...
1	2	...	...	...
	1	2	3	4
	first spin			

Write down the probability of getting:

- (b) a six
- (c) less than 4
- (d) 6 or more

Event 1: go to school Event 2: go to India
Event 3: visit the Taj Mahal

(2 marks)

Which two of these events are mutually exclusive ? and

10. Event 1: Pick a card from a pack. Do not replace it.
Event 2: Pick a second card from the pack.

(4 marks)

Are these events independent ?

Explain how you know

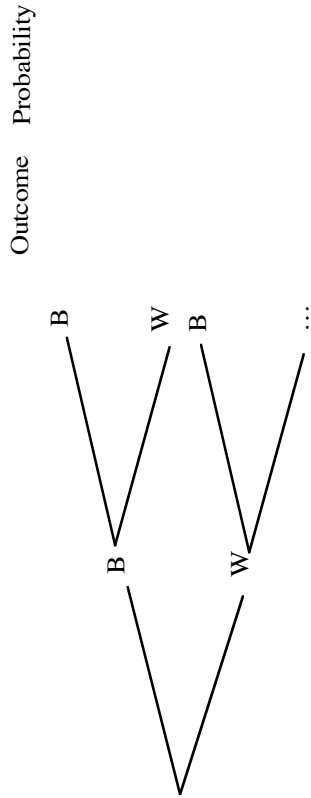
.....



11. One of these counters is chosen at random. It is then replaced.
A second counter is chosen. (10 marks)

(a) What is the probability of getting a black counter both times ?

(b) Complete this tree diagram:



(c) Probability of Black then White =

(d) Probability of only one Black =

OVERALL MARK = / 60

How Likely Is It ?

ASSESSMENT ANSWERS

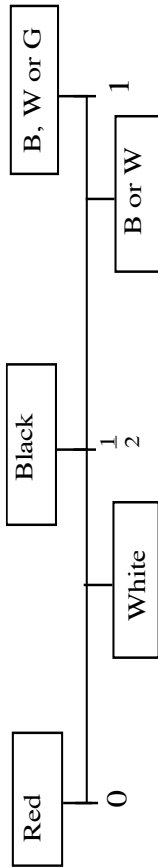


Overall mark = %

1.

Socks in a drawer
3 Black 2 White 1 Green

 One sock is taken out at random.



(a) Put each label into its correct box:

White (W) Black (B) Red (R) Black, White or Green (B, W or G)

(b) Draw in a box for

Black or White (B or W)

2. (a) A coin is tossed. The probability of getting a 'head' is

$\dots \frac{1}{2} \dots$

 (b) You buy 3 raffle tickets. 100 tickets have been sold. The probability of you winning first prize is

$\dots \frac{3}{100} \dots$

 (c) A letter is chosen at random from the word BRILLIANT. The probability of getting an A is

$\dots \frac{1}{9} \dots$

 The probability of getting an I or an L is

$\dots \frac{4}{9} \dots$

 (d) A dice is thrown. The probability of getting a 7 is

$\dots 0 \dots$

3. Is each set of outcomes equally likely (YES) or not equally likely (NO) ? (4 marks)

B	B	W	:	outcomes are (black, white)	...NO...
throw a dice	:	outcomes are (odd score, even score)	:		YES...
throw a dice	:	outcomes are (6, not a 6)	:		...NO...
weather tomorrow	:	outcomes are (snow, no snow)	:		...NO...

4. Here are three ways of estimating probabilities: (6 marks)

- A: look at equally likely outcomes B: look at statistical data
 C: do an experiment or survey to collect data

Which method would you use to estimate the probability:

- (a) that there will be no rain during your summer holiday

B

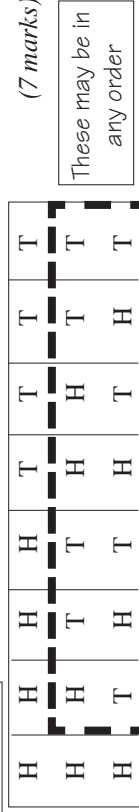
 (b) that your raffle ticket will win first prize

A

 (c) that any student chosen at random from your class has chips for lunch today

C

5. 3 coins are tossed. Complete this list of possible equally likely outcomes: (7 marks)



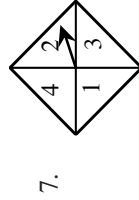
6.

T-shirts	Shorts
red	blue
green	grey

 Liz chooses a T-shirt and shorts. (3 marks)

List all the combinations of colours she could get.

RED & BLUE	RED & GREY	GREEN & BLUE	GREEN & GREY
------------	------------	--------------	--------------



7. The scores on this spinner are not equally likely. (8 marks)

In an experiment, the spinner is spun 400 times. The results are given in the table.

Complete the table:

Score	Frequency	Relative Frequency	Probability to 3 d.p.
1	165	$\frac{165}{400}$	0.4125
2	38	$\frac{38}{400}$	0.095
3	98	$\frac{98}{400}$	0.245
4	99	$\frac{99}{400}$	0.2475



8. This is a fair spinner. It is spun twice. The result recorded is the SUM of the two scores.

(a) Complete this table of scores:

4	5	6	7	8
3	4	5	6	7
2	3	4	5	6
1	2	3	4	5
	1	2	3	4

first spin

Write down the probability of getting:

- (b) a six $\dots \frac{3}{16} \dots$
 (c) less than 4 $\dots \frac{3}{16} \dots$
 (d) 6 or more $\dots \frac{9}{16} \dots$

Event 1: go to school Event 2: go to India
 Event 3: visit the Taj Mahal

Which two of these events are mutually exclusive ? \dots 1 and 2 \dots

10. Event 1: Pick a card from a pack. Do not replace it.
 Event 2: Pick a second card from the pack.

Are these events independent ? \dots No \dots

Explain how you know \dots THE RESULT OF EVENT 1 AFFECTS THE OUTCOMES OF EVENT 2 \dots

(3 marks)

(3 marks)

(2 marks)

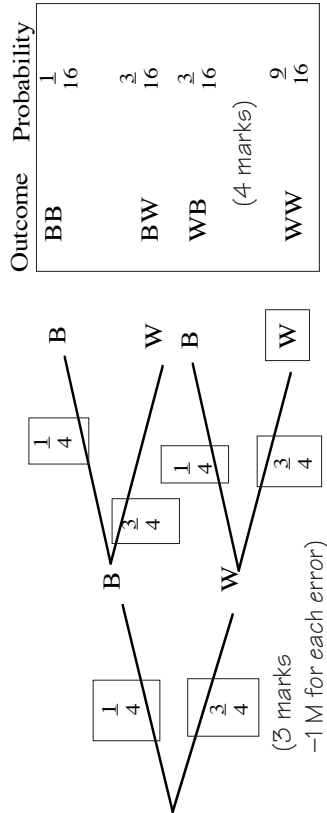
(4 marks)

11. **B** **W** **W** **W**

One of these counters is chosen at random. It is then replaced. A second counter is chosen.

(a) What is the probability of getting a black counter both times ? $\dots \frac{1}{16} \dots$ (1 mark)

(b) Complete this tree diagram:



(c) Probability of Black then White = $\dots \frac{3}{16} \dots$ (1 mark)

(d) Probability of only one Black = $\dots \frac{6}{16} \dots$ (1 mark)

OVERALL MARK = / 60