Maths GCSE Problem Solving Questions Workbook

Probability

GRADES 4 – 6

MATHS-SCHOOL

EXAMPLE

Put the letters A, B or C on each card so that when a card is picked at random
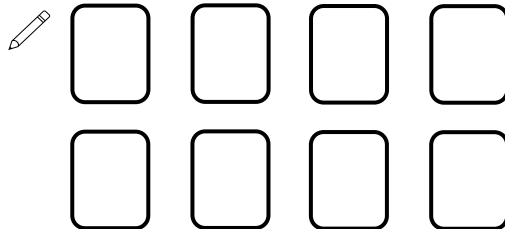- the probability of picking A is 0.5
- the probability of picking a B is four times the probability of picking a C

| A | A | A | A | A |
| B | B | B | B | C |
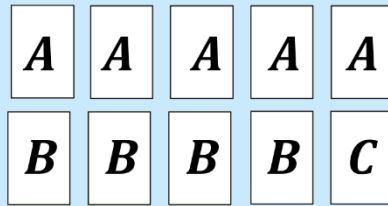
Since A $= 0.5, \frac{1}{2}$ of 10 is 5, so, 5 cards must be A
Since B $= 4C$ and only 5 cards, there can only be 1 C and 4Bs

1 Put the numbers 4, 6 or 8 on each card so that when a card is picked at random
- the probability of picking a 6 is greater than 0.5
- the probability of picking a 4 is twice the probability of picking an 8.

2 Put the numbers 1, 2, 3 or 4 on each card so that when a card is picked at random
- the probability of picking a 1 is greater than 0.5
- the probability of picking a 2 is three times the probability of picking a 3
- the probability of picking a 4 is the same as picking 3
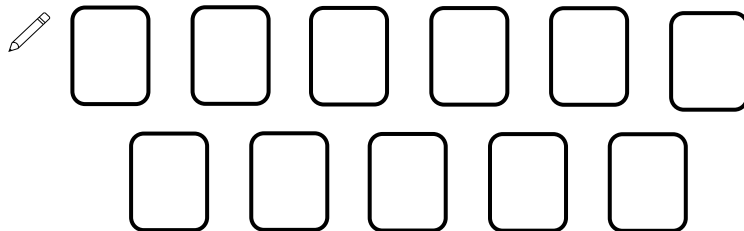
3 Put the numbers 1, 2, 3, 4 or 5 on each card so that when a card is picked at random
- the probability of picking a 1 is exactly than 0.25
- the probability of picking a 5 is two times the probability of picking a 3
- the probability of picking a 2 is three times the probability of picking a 3
- the probability of picking a 4 is three times the probability of picking a 5

1
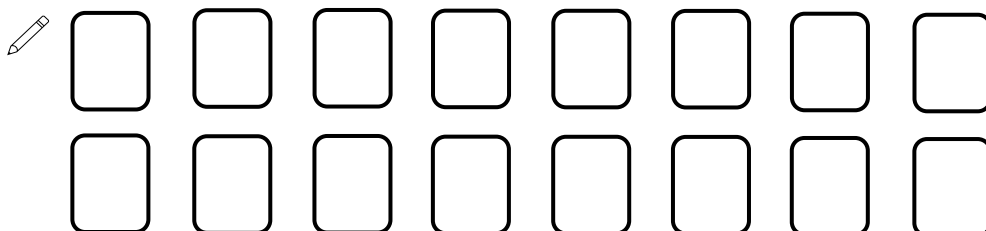
EXAMPLE

There are 10 balls in a bag which are either red, white and blue.
There are twice as many blue balls as red balls.
There are more red balls than white balls.
A ball is taken at random from the bag.
Fill in the table to show the probability of taking each colour.

Colour	Red	White	Blue
Probability	$\dfrac{3}{10}$	$\dfrac{1}{10}$	$\dfrac{6}{10}$

Try different values of red balls until the numbers meet the statements and add up to 10

1 There are 14 counters in a box which are either red, white, green, or blue.

- There are three times as many red balls as blue balls.
- There are more white balls than red balls.
- There are more green balls than white balls.
- A ball is taken at random from the bag.

Fill in the table to show the probability of taking each colour.

Colour	Red	White	Green	Blue
Probability				

2 A bag contains 15 marbles which are only red, white, and blue.

- There are 6 more red than blue.
- There are 3 less white than blue.
- A counter is chosen at random from the bag.
- The probability it is red is $\dfrac{2}{3}$

Fill in the table to show the probability of taking each colour.

Colour	Red	White	Blue
Probability			

3 A box contains coloured straws in four colours. Yellow, Red, Green and Blue.

- The probability it is red is 0.24
- There are 50 red which is 25 more than blue.
- There are three times as many Yellow straws as Green Straws.

Fill in the table to show the probability of taking each colour.

Colour	Yellow	Red	Green	Blue
Probability				

Probability (Shape and ratio properties)

> **EXAMPLE**
>
> A bag contains triangles, squares and hexagons in the ratio of the number of sides of each shape.
> (a) What is the least number of shapes in the bag?
>
> $$3 + 4 + 6 = 13$$
>
> (b) A shape is taken at random from the bag
> Work out the probability that a shape taken from the bag is a square
>
> $$\frac{4}{13}$$

1 A bag contains squares, octagons, & pentagons in the ratio of the number of sides of each shape.

a) What is the least number of shapes in the bag?

b) A shape is taken at random from the bag, work out the probability that a shape taken from the bag has an even number of sides

2 A container has an equal number of squares, rectangles, rhombuses, parallelograms, and kites inside it. There are 2 squares.

a) How many shapes are in the bag?

b) A shape is taken at random from the container
Work out the probability that a shape taken from the has **no** parallel sides

3 A box contains cones, spheres, cylinders, cubes, cuboids and square based pyramids in the ratio of the number of faces of each 3D shape.

a) What is the least number of shapes in the bag?

b) A shape is taken at random from the box
Work out the probability that a shape has an odd number of faces

Page 1 – Mutually exclusive events

1.

| 6 | 6 | 6 | 6 |

| 6 | 4 | 4 | 8 |

2.

| 1 | 1 | 1 | 1 | 1 | 1 |

| 2 | 2 | 2 | 3 | 4 |

3.

| 1 | 1 | 1 | 1 | 2 | 2 | 2 | 3 |

| 4 | 4 | 4 | 4 | 4 | 4 | 5 | 5 |

Page 2 – Mutually exclusive events (worded)

1.

Colour	Red	White	Green	Blue
Probability	$\dfrac{3}{14}$	$\dfrac{4}{14}$	$\dfrac{6}{14}$	$\dfrac{1}{14}$

2.

Colour	Red	White	Blue
Probability	$\dfrac{10}{15}$	$\dfrac{1}{15}$	$\dfrac{4}{15}$

3.

Colour	Yellow	Red	Green	Blue
Probability	0.48	0.24	0.16	0.12

Page 3 – Probability (shape properties and ratio)

1. a) $17 : 4 + 8 + 5 = 17$

   b) $\dfrac{12}{17} : 4 + 8 = 12$

2. a) $10 : 2 + 2 + 2 + 2 + 2 = 10$

   b) $\dfrac{1}{5} :$ Kites only $\rightarrow \dfrac{2}{10} = \dfrac{1}{5}$

3. a) $23 : 2 + 1 + 3 + 6 + 6 + 5 = 23$

   b) $\dfrac{9}{23} :$ Spheres (1), cylinders (3) and square based pyramids (5). 1+3+5=9