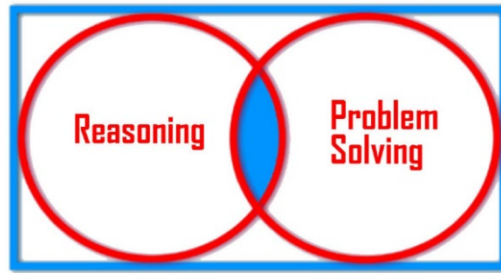


## GCSE Foundation (5 – 1)



[fluidmaths.co.uk](http://fluidmaths.co.uk)

### Mathematical Reasoning Questions

#### (Probability) – Set 1

#### Solutions

**The questions are repeated here for your convenience**

1 What is the probability of choosing a prime number from the set  
 $22 < 2n < 30$

a) 30%

b) 33%

c)  $\frac{2}{7}$

d)  $\frac{100}{3}$  %

**Solution**

$22 < 2n < 30$  {divide the inequality by 2}

$11 < n < 15$

Therefore,  $n = 12, 13$  or  $14$

13 is the only prime number of these three numbers. So, the probability is  $\frac{1}{3}$

$\frac{1}{3}$  as a percentage is  $\frac{100}{3}$  % Correct Answer: D

[3marks]

2 Tamara chooses two numbers from the list  $\{-5, -1, 0, 2, 3, 6\}$   
What is the probability that, the product of the two numbers is zero? Choose only one answer

a)  $\frac{1}{6}$

b)  $\frac{1}{3}$

c)  $\frac{1}{12}$

d)  $\frac{1}{36}$

**Solution**

The only way the product of any 2 numbers in the set can be zero, is when one of the numbers is zero or both are zeros

{You may use a sample space diagram to check}

Since there are 6 numbers and only 1 zero, it means there is a  $\frac{1}{6}$  chance of selecting a zero as the first number and the same chance of selecting a zero as the second number.

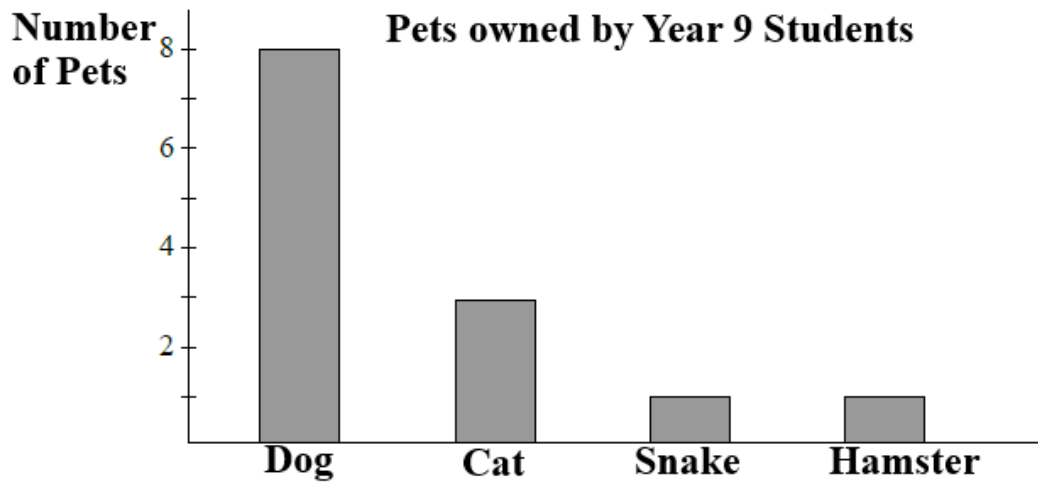
Therefore, for the product of the two numbers to be zero we will have

$$\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$$

Correct Answer: D

[2marks]

3 The bar chart below shows the number of pets owned by some year



9 students in a certain school

What is the probability of selecting a student at random who own a dog or a snake? Choose one answer

- a)  $\frac{8}{13}$
- b)  $\frac{9}{13}$
- c)  $\frac{9}{26}$
- d)  $\frac{81}{169}$

**Solution**

The number of students who owned a dog or a snake will be  $8 + 1 = 9$

The number of year 9 students who own a pet is

$$8 + 3 + 1 + 1 = 13$$

So, the chances of picking a student who owns a dog or a snake is

$$\frac{9}{13}$$

Correct Answer: B

**[2marks]**

4 Kelsey and Keelan are playing a game by rolling two six sided dice.

Kelsey wins if any of the dice show a number above 4

Keelan wins if any of the dice show a number below 4

Is the game fair? Show how you decide

**Solution**

There are 3 numbers on a 6 sided dice below 4 {1,2,3}

There are 2 numbers on a 6 sided dice above 4 {5,6}

So, the chance of the number being below 4 is  $\frac{3}{6}$

The chance of it being greater than 4 is  $\frac{2}{6}$

$\frac{3}{6} > \frac{2}{6}$  Keelan has a better chance of winning so the game is not fair

**[2Marks]**

5 Janis arranges the digits 3, 1, 5 and 8 to form a four digit number.  
What is the probability that the product of the digits is above 110?

a) 0

b) 1

c) 0.5

d) 0.55

**Solution**

3,1,5 and 8 will have the same product no matter what order they are arranged that is  $3 \times 1 \times 5 \times 8 = 120$

There is a 100% chance that the product of the digits is above 110.

Correct Answer: B **[1mark]**

6 N is an integer from the set  $-5 \leq n < 6$   
The probability that  $N^3 > 50$  will be?

- a)  $\frac{4}{11}$
- b)  $\frac{2}{11}$
- c)  $\frac{3}{5}$
- d) 10%

**Solution**

There are 11 numbers in the set  
 $\{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$

The only numbers you can cube to obtain a value more than 50 are 4 and 5.

That is,  $4^3 = 64$  and  $5^3 = 125$

So, N can be only 2 out of 11 numbers.

Therefore, the probability that  $N^3 > 50$  is  $\frac{2}{11}$

Correct Answer: B [1mark]

7 Steve chooses a number from the set  $\{2, 3, 4, 5, 6, 7\}$   
Nathan chooses a number from the set  $\{1, 3, 5, 7, 9, 11\}$   
What is the probability that both Steve and Nathan choose a number above 9? Choose one answer

- a) 30%
- b)  $\frac{1}{3}$
- c) 0
- d)  $\frac{1}{6}$

**Solution**

There are no numbers above 9 in Steve's Set.

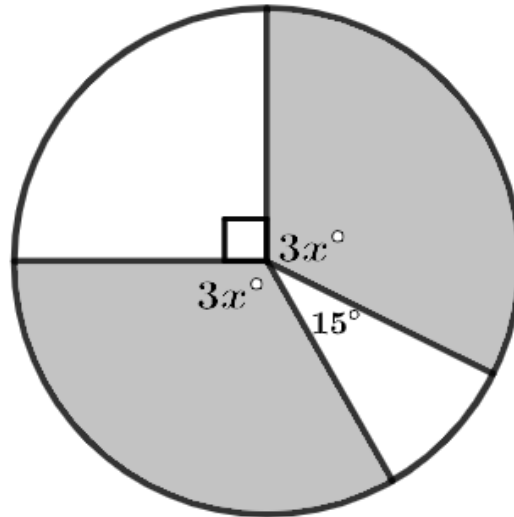
So, it's impossible for both Steve and Nathan to choose numbers from their respective sets which will be above 9

Therefore, the probability is 0

Correct Answer: C

[1mark]

8 A circular spinner is shown below



What is the probability that the spinner lands on a shaded area?

a)  $\frac{1}{36}$

b)  $\frac{1}{60}$

c)  $\frac{17}{24}$

d)  $\frac{37}{360}$

**Solution**

The shaded area will be  $3x + 3x = 6x$

The sum of all angles around a point is  $360^\circ$

Therefore,  $6x + 15 + 90 = 360$

$6x + 105 = 360$  {Subtract 105 from both sides}

$6x = 255$

Therefore, the shaded area represents  $\frac{255}{360}$  of the circle.

Hence, the probability that the spinner lands on the shaded area will be equal to  $\frac{255}{360} = \frac{17}{24}$

Correct Answer: B

**[3marks]**

- 9 Here is a Two-way table about the number of Year 10 and Year 11 students who 'liked' or 'disliked' the new school uniform. Complete the table.

	Like	Dislike	Total
Year 11	115		
Year 10		75	
Total	205		410

- a) Use the table to explain why the probability that a year 10 student dislikes the uniform is different from the probability that a student that dislikes the uniform is a year 10 student.
- b) What is the probability that a student picked at random likes the new uniform?

**Solution**

Complete the table using the known values

	Like	Dislike	Total
Year 11	115	130	245
Year 10	90	75	165
Total	205	205	410

[2marks]

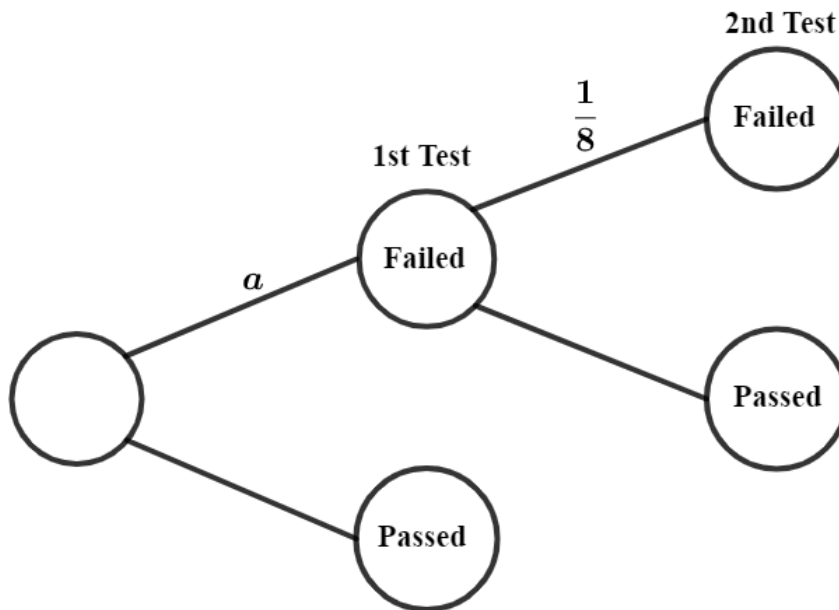
- a) Using the table, the probability that a year 10 student dislikes the uniform is  $\frac{75}{165} = \frac{5}{11}$

Whereas the probability a student who dislikes the uniform is in year 10 is  $\frac{75}{205} = \frac{15}{41}$

[2marks]

- c) The probability that a student picked at random likes the new uniform is  $\frac{205}{410} = \frac{1}{2}$  [1mark]

- 10** Lewis is going to take his driving test  
The diagram below shows the probabilities.



**Solution**

- a) What is the probability that Lewis passes his 1<sup>st</sup> Test?

$1 - a$       **[1mark]**

- b) What is the probability that Lewis fails his 2<sup>nd</sup> Test.

To fail the 2<sup>nd</sup> test means.

He would have already failed the 1<sup>st</sup>

Therefore,  $a \times \frac{1}{8} = \frac{a}{8}$

**[1mark]**