



Q1) A map of England is drawn to a scale of 1:325,000. How many cm on the map would show 65km?

Q2) A road map measured 3.5cm which represented a distance of 35km. What distance does 1mm on the map represent?

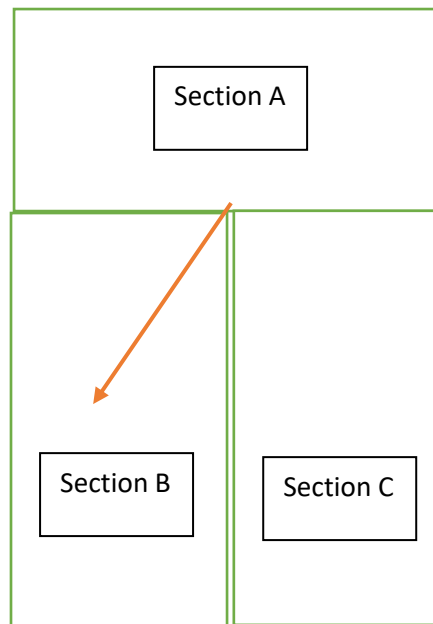


## Crystal Tuition - Maths

Q3) A builder can finish building one wall in 3 hrs. How many hours are needed for 2 builders working at the same rate to finish building five walls?

Q4) If 8 monkeys take 8 minutes to eat 8 bananas. How many monkeys would it take to eat 48 bananas in 24 minutes?

Q5) What is the probability that the spinner lands on Section A? How about the probability the spinner lands on Section B?





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Q6) A restaurant serves 2 starters, 2 main courses and 3 desserts. How many different three course combinations can be served? (Assume you must have one dish for each course)

Q7) A restaurant serves 12 starters, 3 main courses and 4 desserts. How many different three course combinations can be served? (Assume you must have one dish for each course)



Crystal Tuition - Maths

Q8) Richard rolls two 1-6 (standard) dice together once and makes a note of the total score.

- a. What is the probability Richard gets a single digit score?
- b. What is the probability Richard rolls a prime number from the two dice?
- c. What is the probability that Richard rolls a square number?



Q9) Can you find numbers to replace X, Y and X in this sum?  
(X, Y and Z are all different integers)

$$\begin{array}{r} \phantom{+} XYZ \\ \phantom{+} XYZ \\ + \phantom{+} XYZ \\ \hline \phantom{+} YYY \end{array}$$

Q10) Can you find a four-digit number which is reversed when multiplied by 9?  
(i.e  $ABCD \times 9 = DCBA$ )



## ANSWERS

Q1) Workings:

1cm:325,000cm

Using the below:

100cm: 1m

1,000m = 1km

Therefore:

100,000cm = 1km

We can re-write as follows:

1cm = 3.25km

? = 65km

$65\text{km}/3.25\text{km} = 20$

**Q1) Ans: 20 cm**

Q2) Workings:

3.5cm: 35km

1cm: 10km

1mm: 1km

**Q2) Ans: 1km**



## Crystal Tuition - Maths

Q3) Workings:

1 builder: 3 hrs = 1 wall

2 builders: 1.5 hrs = 1 wall

2 builders: ????? = 5 walls

Therefore  $1.5 \times 5 = 7.5$  hrs

**Q3) Ans: 7.5 hrs**

Q4) Workings:

8 monkeys: 8 mins = 8 bananas

1 monkey: 8mins = 1 banana

1 monkey: 24mins = 3 bananas

?????: 24mins = 48 bananas

Therefore  $48/3 = 16$  so  $16 \times 1 = 16$

**Q4) Answer: 16 monkeys**





## Crystal Tuition - Maths

### **Q5) Answer: $\frac{1}{2}$**

It is very tempting to say  $\frac{1}{3}$  since there are three shapes that are identical. However, we must consider the “angle” of each section. In a circle, the total internal angle is 360

Section A = straight line (therefore 180 degrees)

$$180/360 = \frac{1}{2}$$

Section B = 90 degrees so  $90/360 = \frac{1}{4}$

### **Q6) Answer: 12**

Let's call

starters: A,B

main: C,D

desserts: E,F,G



## Crystal Tuition - Maths

Combos are:

ACE      ADE  
ACF      ADF  
ACG      ADG

BCE      BDE  
BCF      BDF  
BCG      BDG

So 12 combos is the answer. However, there is a shorter way!

There are 2 starters, 2 main courses and 3 desserts so you can just do:

$$2 \times 2 \times 3 = 12$$

**Q7) Answer: 144**

$$\text{Do: } 12 \times 3 \times 4 = 36 \times 4 = 144$$



## Crystal Tuition - Maths

**Q8) a) Answer =  $30/36 = 5/6$**

Q8 explanation:

$$6+6 = 12$$

$$6+5 = 11$$

$$5+6 = 11$$

$$5+5 = 10$$

$$6+4 = 10$$

$$4+ 6 = 10$$

So 6 possibilities above for two digit scores, therefore 30 possibilities for one digit scores.  
(Since there are 36 different combinations).

$$30/36 = 5/6$$

8b) What is the probability that Richard rolls a prime number?

Prime numbers are:

2,3,5,7,11



## Crystal Tution - Maths

Compos are:

$$1+1 = 2$$

$$1+2 = 3$$

$$2+1 = 3$$

$$1+4 = 5$$

$$4+1 = 5$$

$$2+3 = 5$$

$$3+2 = 5$$

$$1+6 = 7$$

$$6+1 = 7$$

$$2+5 = 7$$

$$5+2 = 7$$

$$3+4 = 7$$

$$4+3 = 7$$

$$5+6 = 11$$

$$6+5 = 11$$

$$15/36 = 5/12$$



## Crystal Tuition - Maths

8c) What is the probability of rolling a square number?

1,4,9 but exclude 1 so just 4 and 9

**8c) Answer = 7/36**

$$1+3 = 4$$

$$3+1 = 4$$

$$2+ 2 =4$$

$$3+6 = 9$$

$$6+ 3 = 9$$

$$4+ 5 = 9$$

$$5+ 4 = 9$$



## Crystal Tuition - Maths

**Q9) Answer: X = 1, Y = 4, Z = 8**

$$XYZ + XYZ + XYZ = 3(XYZ) = YYY$$

In the above equation, we can say 3 times  $XYZ = YYY$  since we are just adding  $XYZ$  to itself 3 times.

Let's write  $3(XYZ) = YYY$  or  $XYZ = YYY/3$

We just divide both sides by 3.

Let's try  $YYY = 111$ ,  $YYY = 222$ ,  $YYY = 333$  etc.

$111/3 = 37$  (can't be this as it is a 2 digit number)

$222/3 = 74$  (can't be this as it is a 2 digit number)

$333/3 = 111$  (can't be this as the 3 digits are all the same)

**$444/3 = 148$  (let's check this!)**

$$\begin{array}{r} 148 \\ 148 \\ + 148 \\ \hline 444 \end{array}$$



## Crystal Tuition - Maths

Q10) Explanation:

DCBA must be a multiple of 9 (as ABCD is being  $\times 9$ ). Multiples of 9 have a property where the sum of the digits is also a multiple of 9.

i.e  $D+C+B+A = 9Z$  (where  $Z$  is an integer)

We know  $A$  must be 1 because if we tried  $2000 \times 9 = 18,000$

The result is a 5-digit number, so the only way to ensure we have a 4 digit number is to try  $A = 1$

Thus,  $1BCD \times 9 = DCB1$

We can now work out  $D$  because in the  $9 \times$  time,  $9 \times 9 = 81$

So we now have

$$\begin{array}{r} 1BC9 \\ \times \quad 9 \\ \hline 9CB1 \end{array}$$

Looking at the above, we know two facts:

$B$  must be either 0 or 1 because if  $B$  was 2 or more, then there would be carrying. Since  $9 \times 2 = 18$ . This cannot be the case as we must have no carrying (since we want  $1 \times 9 = 9$ )



## Crystal Tuition - Maths

Remembering the special properties of multiples of 9:

$$D+C+B+A = 9Z$$

$$9+C+0+1 = 18 \text{ (so C must be 8 if B = 0)}$$

Or

$$9+C+1+1 = 18 \text{ (so C must be 7 if B = 1)}$$

Let's try the two options:

1089 or 1179

$$\begin{array}{r} 1089 \\ \times \quad 9 \\ \hline 9801 \end{array}$$

$$\begin{array}{r} 1179 \\ \times \quad 9 \\ \hline 10,611 \end{array}$$

**Q10) ANSWER = ABCD = 1089**