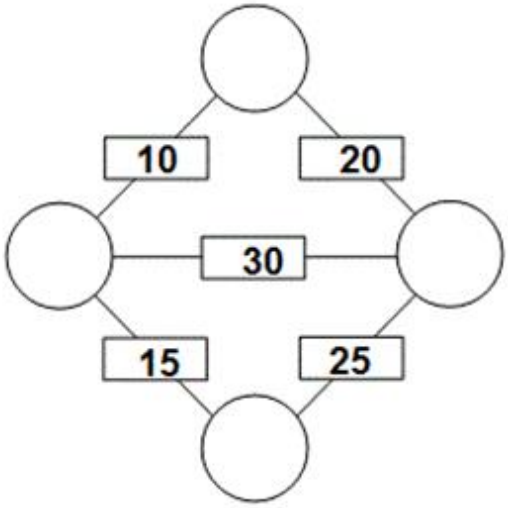
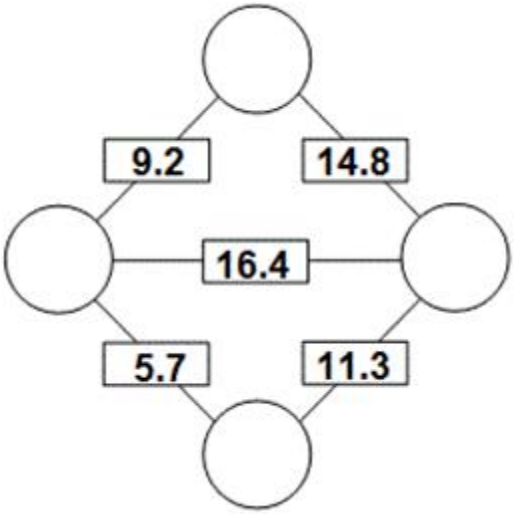
All answers are worth 1 mark.	
1.) My recipe for a 12 inch vegetarian supreme pizza includes $4\frac{1}{2}\frac{1}{2}$ mushrooms, $6\frac{1}{4}\frac{1}{4}$ olives, $\frac{1}{5}\frac{1}{5}$ of an aubergine and $\frac{1}{3}\frac{1}{3}$ of a corn. I want to make the smallest possible number of 12inch pizzas without having part of any vegetable left over. How many olives do I need?	
2.) How many ways can you give change for a ten pence piece?	
3.) A teacher decided to give sweets to the 30 children in his class. He gave one sweet to the first child, two to the second and three to the third and so on. How many sweets did the teacher give out in total?	
4.) What is the area of a circle with circumference C?	
5.) In a bakery, Seonaid, Joshua, Jack, Marcus and Ralph measured the length of a baguette using the same measuring instrument, but each read the scale to a different level of accuracy. Their five answers are shown below. Four of them are correct (to the chosen level of accuracy), but one is not. Which is the odd one out? A. 130mm B. 132mm C. 132.7mm D. 132.69mm E 132.692mm	
6.) **Arithmagons:** In Addition Arithmagons the value of each square is the sum of the values in the circles or vertices on each side of it. Determine the value of each circle to complete the following puzzles.	



7.)



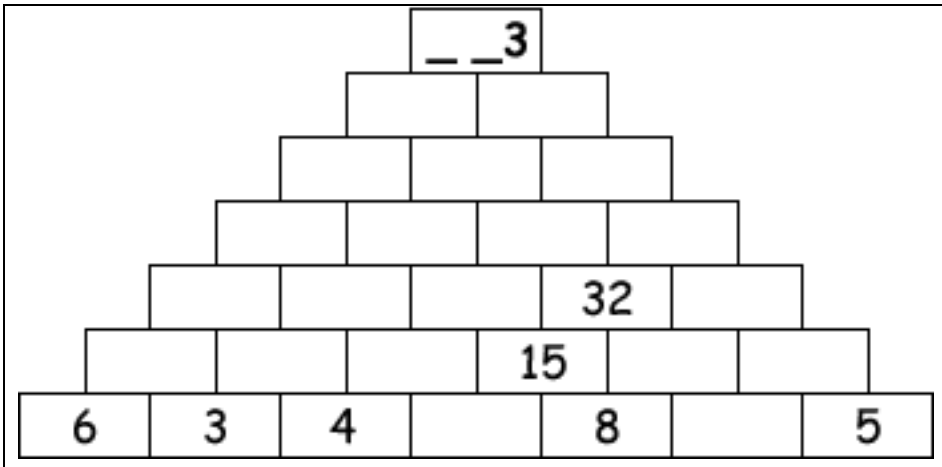
8.) **All the digits:**
If all the whole numbers from 1 to 1000 inclusive are written down, which digit appears the smallest number of times?

9.) A car with five tyres (four road tyres and a spare) travelled 40,000 km. All five tyres were used equally. How many kilometers' wear did each tyre receive ?

10.)
One Short:

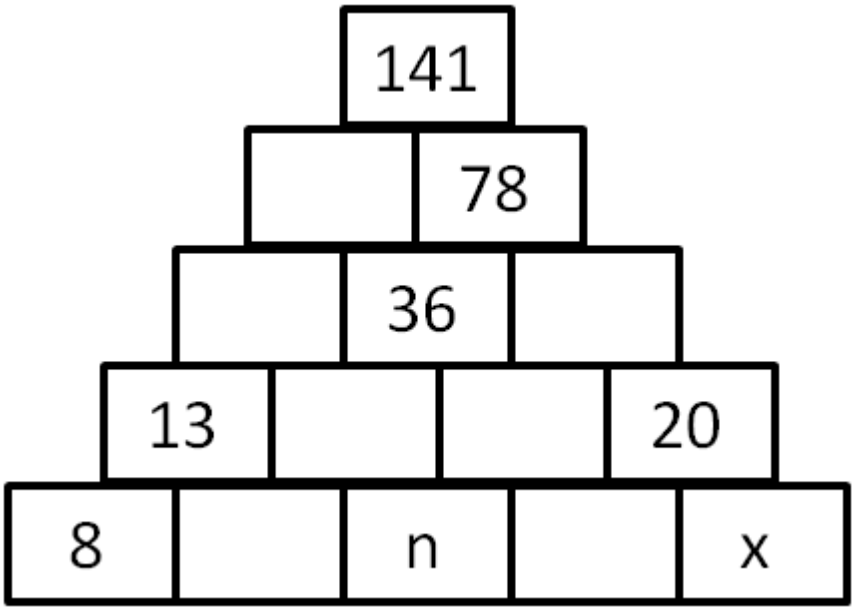
479 has the interesting property that when it is:
divided by 6 it leaves a remainder of 5
divided by 5 it leaves a remainder of 4
divided by 4 it leaves a remainder of 3

divided by 3 it leaves a remainder of 2 divided by 2 it leaves a remainder of 1 Which is the smallest number with this property ?	
11.) **Bouncing Ball:** A ball travels a certain distance before bouncing, half as far before the next bounce, and so on. If it has travelled 93 meters at the fifth bounce, how far was the first bounce? 	
12.) Relations: If: 2 + 3 → 10 7 + 2 → 63 6 + 5 → 66 8 + 4 → 96 Then: 9 + 7 = ?	
13.) A pub quiz has twenty questions with seven points awarded for each correct answer, two points deducted for each wrong answer and zero for each question omitted. Gabriel scores 87 points. How many questions did he omit?	
14.) **Pyramid:** Each block in this tower is to have a number displayed on it. Some are already done. For each block above the bottom row, the number on it should be the sum of the numbers on the two blocks it stands upon. Find the number that should go on the very top brick?	



15.)

What number should replace n ?
What number should replace x ?



16.) Joe's 101st birthday is tomorrow. So his age in years changes from a square number (100) to a prime number (101). How many times has this happened before to him?

17.) A word game uses dice with a letter on each face. Three views of one of the dice are shown below. Which letter is the face opposite H?

18.) **Special Offer:**

Roly Rolinson was delighted when he heard the manufacture of SNAP, his favourite chocolate bar, were having a special promotion for a limited period. By collecting eight (8) special SNAP labels, he could have one free SNAP bar.

Roly persuaded all his friends to donate their labels to him and, by the end of the period, he had collected a total of 71 labels.

How many free SNAP bars is it possible for Roly to collect?

19.) Juliano the clockmaker has two antique clocks. One gains ten seconds every hour, while the other loses twenty seconds every hour. He set both clocks to show the correct time at 9am on 4 February 2015. On what date will they next show the correct time simultaneously?

A. 19 February B. 6 March C. 5 April

D. 4 June E. 3 August

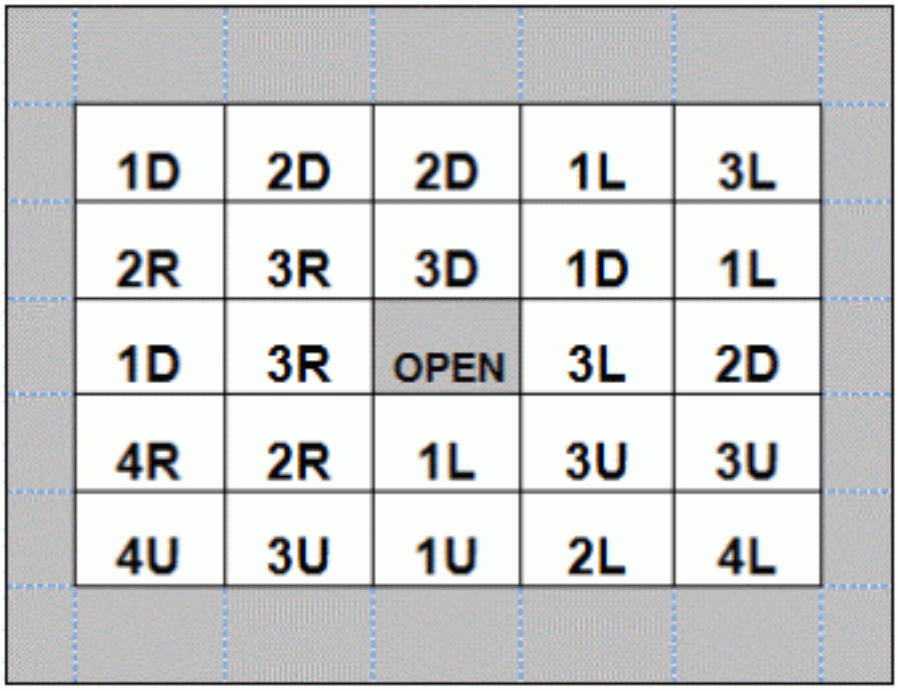
20.) **The Crafty Gardener:**

When planting plants Gary the Gardener liked to make the most of the plants he had and so he found a way to plant seven rose bushes so that he had six lines with three rose bushes in each line.
Draw a diagram below to show how he did it.

21.) **Safety Code:**

To open this safe you must **press all the buttons** in the **correct order**. The number on each button tells you how many squares

you move and the letters tell you the direction (U = up, D = down, L = left and R = right). Which is the first button you must press to open this safe?



22.) Currency conversion

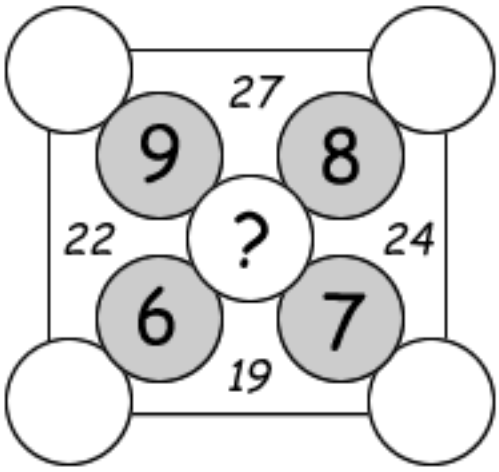
Mrs. Bag flies from the UK to Shanghai just to buy a fake Gucci handbag. The original handbag in the UK cost £1110 and her return flight to Shanghai cost £855. The handbag cost her 450 rmb. Did she save any money from buying the fake Gucci bag in Shanghai, if so how much? (There are 9.707 rmb to the pound)

23.) The names of the whole numbers from one to twelve are written down in the order they occur in a dictionary. What is the fifth number in the list?

24.) **Cross Sums:**

The four numbers, in italics, outside the nine circles represent the sum of the numbers in the five surrounding circles. The numbers in the circles can only be 1 to 9 and each number can be used

only once. Four numbers have been provided to get you started. Find the number that should be in the centre of the X.



25.) 'As I was going to St Ives I met a man with seven wives; each wife had seven sacks; each sack had seven cats; each cat had seven kits.' If it costs 10p per day to feed each kit and 20p per day to feed each cat, what is the man's daily pet-food bill?

26.) This table contains each of the five vowels- A, E, I, O, U - five times. Show how to cut the 5 x 5 square into five different pieces each of which contains all the vowels once only.

E	A	I	O	I
U	E	U	E	O
O	I	A	O	A
I	U	E	A	I
A	O	U	E	U

27.) A Wenzhou orange costs 7 coins, a green orange costs 3 coins and 3 golden oranges cost 1 coin. If 100 coins buys 100 oranges in total, how many Wenzhou oranges, green oranges and golden oranges is it possible to buy with the 100 coins?

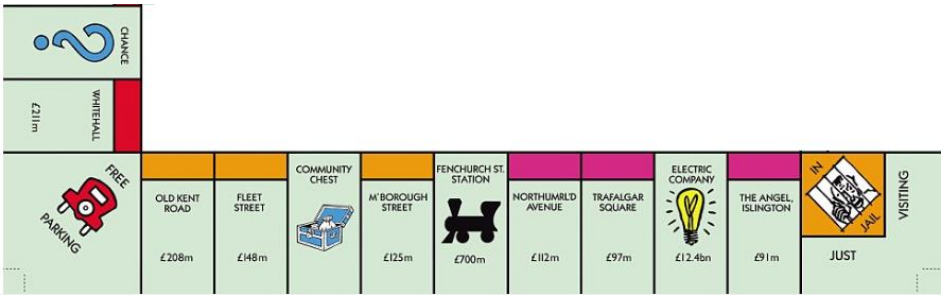
28.) In Marks & Spencer, you can either buy a packet of shortbread rounds (round biscuits), or a cuboid slab of shortbread, also sold in a packet. (Use π to 3dp)

The round biscuits have a diameter of 5cm and are 2cm thick. There are 15 biscuits in a packet, and the packet costs £1.99. The cuboid slab of shortbread measures 16 cm by 18 cm, and is 2.25cm thick. This packet costs £2.25 Which packet gives you the most shortbread for your money? Explain your answer.	
29.) Greek Life Span: Diophantus' was a 3rd Century AD Greek mathematician from Alexandria and sometimes called "the father of algebra". Little is known of his life but one of his admirers described his life in the following classic algebraic riddle (or a fractional 'Life Span' problem). "Diophantus' youth lasted 1/6 of his life. He grew a beard after 1/12 more of his life. After 1/7 more of his life, Diophantus married. Five years later he had a son. The son lived exactly 1/2 as long as his father, and Diophantus died just four years after his son's death. How many years did Diophantus live?"	
30.) John, Peter, Rudolf, Susie and Tony decide to set some questions for the Schools Mathematical Challenge. John thinks up twenty-five questions and circulates them to the others. Peter, not wishing to be outdone, then sets twenty-six questions. Rudolf decides he had better get cracking and produces thirty questions. Susie sets to and comes up with thirty-nine posers, only to be beaten by Tony who produces fifty-five stunning problems. If each person takes half as long as the previous person to set each question, and Rudolf takes one hour to set all his questions, then the total time spent setting questions is. A. 7h 10½ min B. 11h 34½min C. 7h 45 min D. 2h 55 min E. 5h 50 min	
31.) Bilbo and Frodo have just consumed a plateful of cherries. Each repeats the rhyme 'Tinker, tailor, soldier, sailor, rich man, poor man, beggar man, thief' over and over again as he runs through his own heap of cherry stones. Bilbo finishes on 'sailor', whereas Frodo finishes on 'poor man'. What would they have	

finished on if they had run through both heaps together? A. tinker B. tailor C. soldier D. thief E. can't be sure	
32.) In this multiplication U,K,S,M,C represent different digits. What does S represent? U K S M C x 4 C M S K U	
33.) Next Friday is 'Friday the Thirteenth'. When will the next 'Friday the Thirteenth' fall?	
34.) Four comrades are racing side by side down a dusty staircase. Frodo goes down two steps at a time, Gimli three, Legolas four and Aragorn five. If the only steps with all four's footprints are at the top and the bottom, how many steps have just one footprint? A. 16 B. 17 C. 20 D. 22 E.44	
35.) Diana enjoyed inventing games to play with her younger brother, Joe. Sometimes, to add spice to the games, they would stake their pocket money on the outcome. One day she invented a very simple game where they each threw a dice, and then calculated the difference between them. Now the difference could be either 0,1,2,3,4 or 5, so to be fair it was decided that Diana would be declared the winner if the difference was 0,1 or 2, while Joe would be the winner if the difference was 3,4 or 5. After a few throws Joe began to lose interest, but then Diana encouraged him by promising to pay him 10p every time he won two consecutive throws as long, as he paid her 5p every time she won three consecutive throws. Joe couldn't resist this offer… but was he wise? Explain.	
36.) In the game of Monopoly, the aim is to travel around the board, purchasing property and collecting as much money as possible. If an opponent lands on your property, he or she must pay you an amount of money as stated on that property card.	

The most visited square on the monopoly board is actually the Jail-square. To move around the board, each player must roll two dice, and then add together the two numbers in order to work out how many spaces to move forwards.

The photo below shows you part of a Monopoly board. It is not possible to buy the chance, community chest, or Free Parking squares. Using your maths knowledge, which space/spaces should you buy and why?



37.) Here is a description of a modal pupil who took part in the original *CensusAtSchool* in 2000.

She is a female, 150 cm tall with a right foot length of 22 cm, in Year 7 at school and born in England. She lives in a household consisting of four people with one male and one female under 18 and they have not moved in the last year. She has got access to a

computer and the Internet at home. At school her favourite subject is Art. She walks to school which is one kilometre away and takes 10 minutes to get there.

Unfortunately when we look at our data we have no such pupil who took part in *CensusAtSchool*!

Now let us look at a description of the modal pupil in 2001.

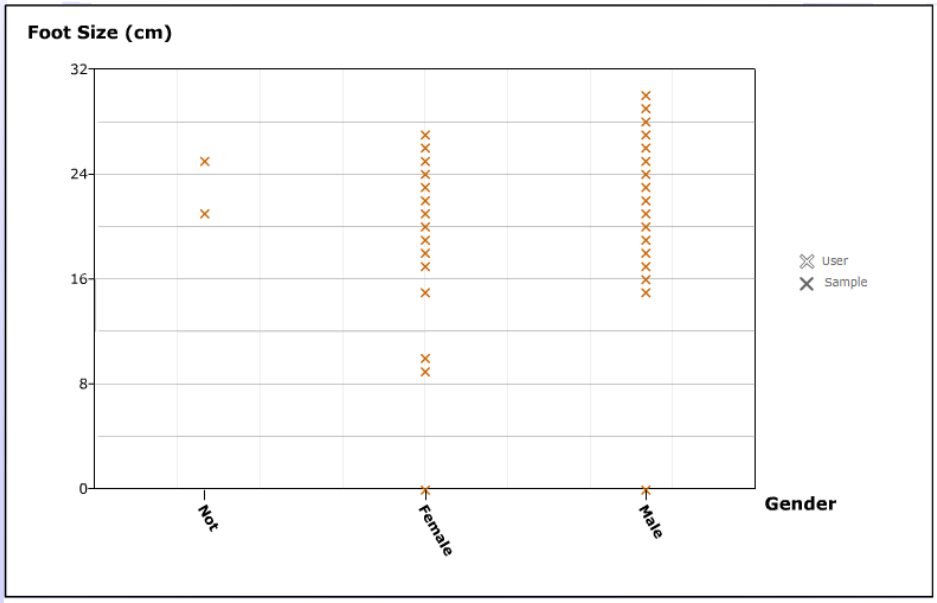
This time he is aged 12, was born in August and is 160 cm tall with a foot length of 23 cm and blue eyes. He had cereal for breakfast on the day they filled in the online questionnaire and regularly tidies his room at home. His favourite sport is football and he has access to a computer and the Internet at home as well as his own mobile phone.

However once again there is no pupil who fits this description in our database.

Try to explain why the modal pupil does not exist.

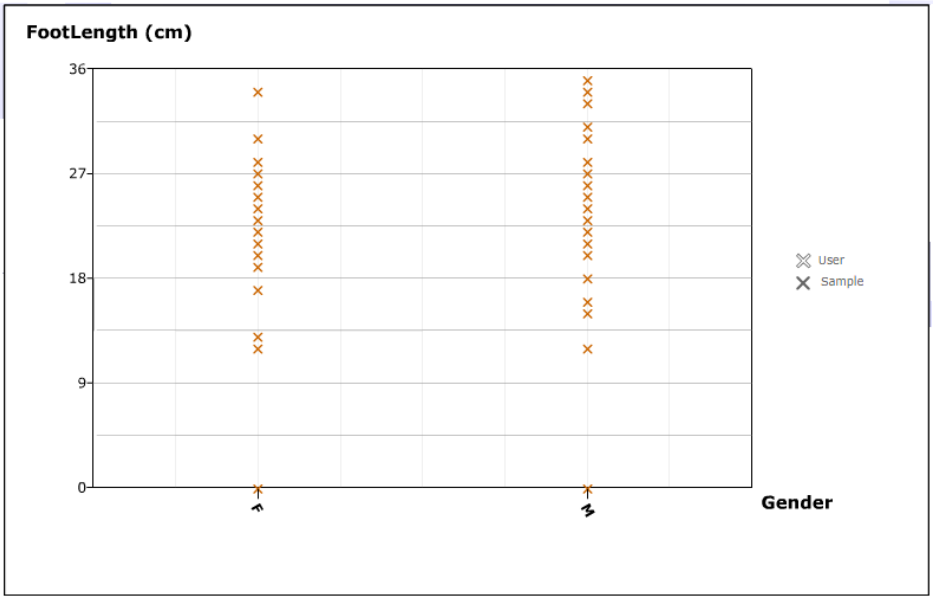
38.) Here is some data from secondary children for the school years 2000 to 2001 and 2011 to 2012.

Scatter graph of **Gender** against **Footlength (cm)**



UK Secondary 2000-1

Scatter graph of **Gender** against **FootLength (cm)**



UK Secondary 2011-12

The graph appears to show that children's shoe sizes are getting larger. Explain why this may not be the case.