FOR ENTRY INTO YEAR 3
SAMPLE PAPER 2

MATHEMATICS

Time allowed: 2 hours

Instructions to candidates

In the boxes below write your name, surname and form.
Answer the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates

This paper has 22 questions.
There are 11 pages in this question paper.
Full marks may be obtained for answers to all questions.
The total marks for this paper is 100.
The marks for each question is shown in round brackets, e.g. **(2)**
Calculators may be used.

Advice for candidates

Write your answers neatly and in good English.
Work steadily through the paper.
Do not spend too long on one question.
Show all stages in any calculations.

Materials required for the paper

Calculator, ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Surname:

Name:

....

Total Marks:

1. Use the grid below to answer the questions.
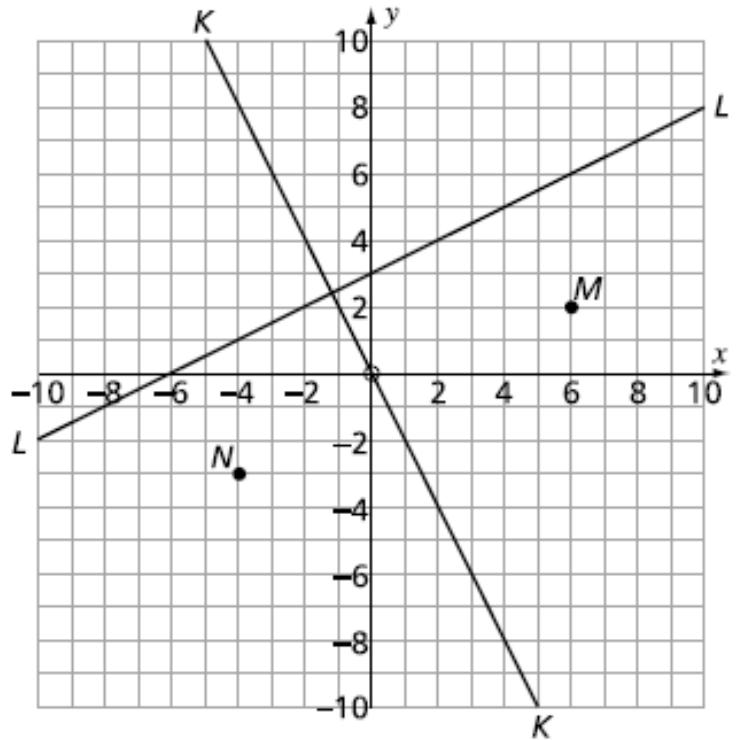
(a) Write down the gradient of:

    i)   Line L ………….   (1)

    ii) Line K ………….   (1)

(b) Draw a line through point M with gradient 4.

                                                    (2)

(c) Draw a line through point N with gradient -1.   (1)

(d) Write down the equation of the line you drew in (c)

                                                    (2)

_____ (7 marks)

2. Use your calculator to work out:

(a) $27^{\frac{1}{3}}$

                                                    (1)

(b) $\sqrt{6.76 \times 10^8}$, giving your answer in standard form.

                                                    (2)

_____ (3 marks)

3. The graph shows how Tom's distance from home varies with time, when he visits Ian. Tom made a stop at a kiosk to buy a newspaper before arriving to Ian's house.

(a) How long is Tom travelling before he makes his first stop?

(1)

(b) How far is it from Tom's house from the kiosk?

(1)

(c) For how long does Tom stop at the kiosk?

(1)

(d) What is Tom's speed during the first 20 minutes? Give your answer in m/min.

(2)

_____ (5 marks)

4. By rounding values to one significant figure, estimate the answer to $\dfrac{35.98 \times 44.2}{0.17 \times 20.369 \times 89}$. Show your work clearly.

$\approx$ ……………

_____ (2 marks)

5. A pack of 26 cards is made, each with a different letter of the alphabet on it. One card is chosen at random. What is the probability of choosing:

(a) a letter from the word "exams"

(2)

(b) not a letter from the word "success"

(2)

_____ (4 marks)

6. How much would you have in the bank if you invest £16000 at 3.5% interest per annum for 8 years?

……….. (2)

_____ (2 marks)

7. Put the following set of data into a stem-and-leaf diagram. Remember to give a key. In each case write down the range, the mode and the median.

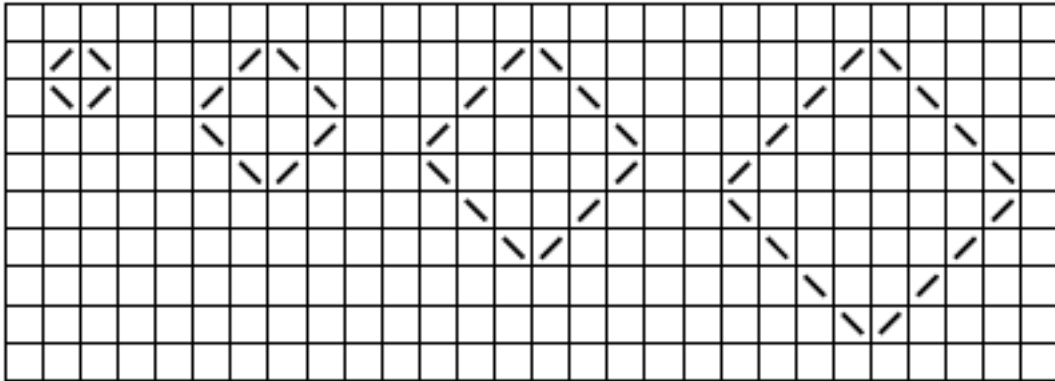| 21	45	36	32	32	33	27	42	41
37	29	31	35	30	44	42	29	30
44	32	25	26	32	29	41	22	32

Range: ………………   Mode: ……………..   Median: ……………
_____ (8 marks)

8. A shirt, originally priced at £60, was reduced to £48 in a sale. What was the percentage reduction in the price of the boots?

_____ (2 marks)

9. The shapes below are made using matches:

(a) How many matches would be needed for the 6th shape?

6th shape ………matches   (1)

(b) How many matches would be needed for the nth shape? (*Write down the equation*)

nth shape ………matches   (2)

(c) Which shape contains 88 matches?

(2)

_____ (5 marks)

10. For the following word problem, define your variables and clearly show all working out. You must form an equation and solve it algebraically.

A father is 20 years older than his son. In five years time, the father will be three times as old as his son. If the son is x years old today, form an equation and solve it to find the ages of both the father and son today.

Father is ……… *years old*

Son is ……… *years old*   (4)

_____ (4 marks)

11. Solve the following equations:

(a) $2(2x-3)-5(x-6)=0$

$x =$ …………… (3)

(b) $\dfrac{8}{5x-7} = \dfrac{4}{3x+2}$

$x =$ …………… (4)

_____ (7 marks)

12. A pipe of diameter 10 cm and length 2 m is half full of water. How many litres of water are in the pipe? Use π on your calculator or $\pi=3.142$ and give your answer to 3 decimal places.
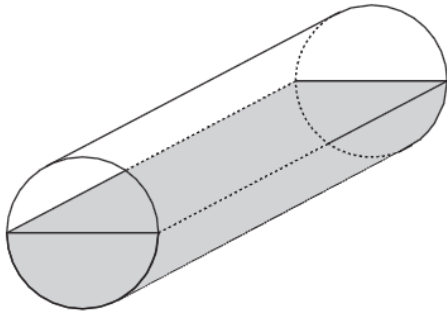
_____ (4 marks)

13. Write down the inverse function of each of the following functions.

   (a) $x \rightarrow 3(x+5)$

   ....
   (3)

   (b) $x \rightarrow \dfrac{(x-2)}{7}$

   ....
   (3)

_____ (6 marks)

14. Three identical machines produce 80 identical tyres in 2 hours. How many tyres can be produced by two machines in 5 hours?
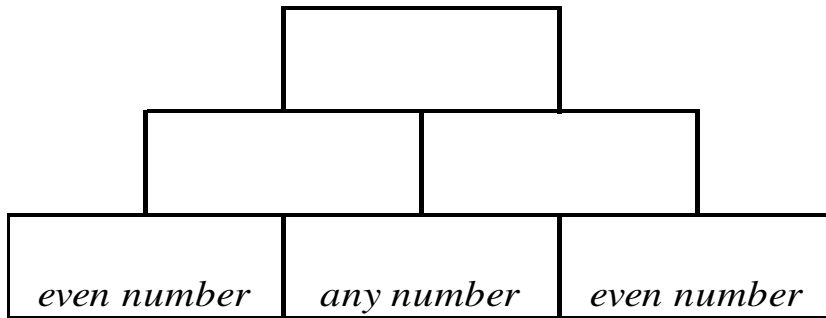
_____ (5 marks)

15.
(a) Explain why triangles PQR and STR are similar.
(b) Find the length of ST.
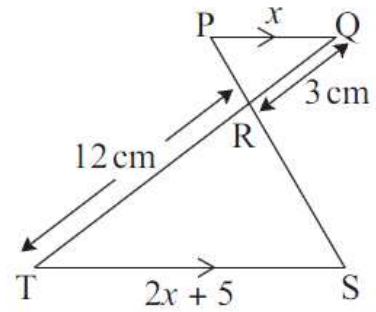
_____ (5 marks)

16. In this pyramid, the number in each brick is found by adding the two numbers beneath it.

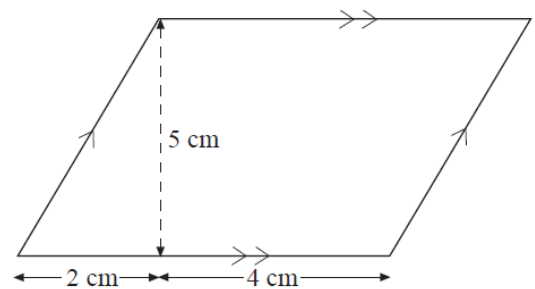
| even number | any number | even number |

Prove using algebra, that the top number will always be a multiple of 2. (*Use different letters for each number*)
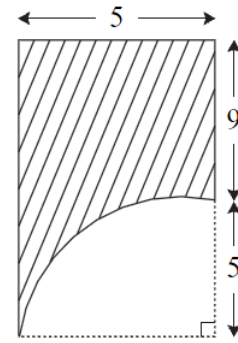
(3)

_____ (3 marks)

17. Calculate the perimeter of the parallelogram below, giving your answer to the nearest milimetre.
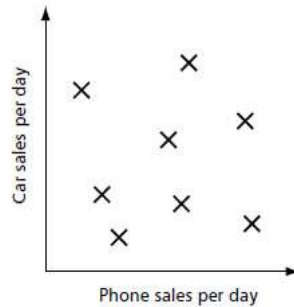

_____ (3 marks)

18. Calculate the area of the shaded shape shown. All lengths are given in metres. Use π on your calculator or $\pi=3.142$ and give your answer to 1 decimal place.

_____ (4 marks)

19. State which type of correlation is shown by each scatter graph below.

....

_____ (3 marks)

20. Expand and simplify each of the following expressions:
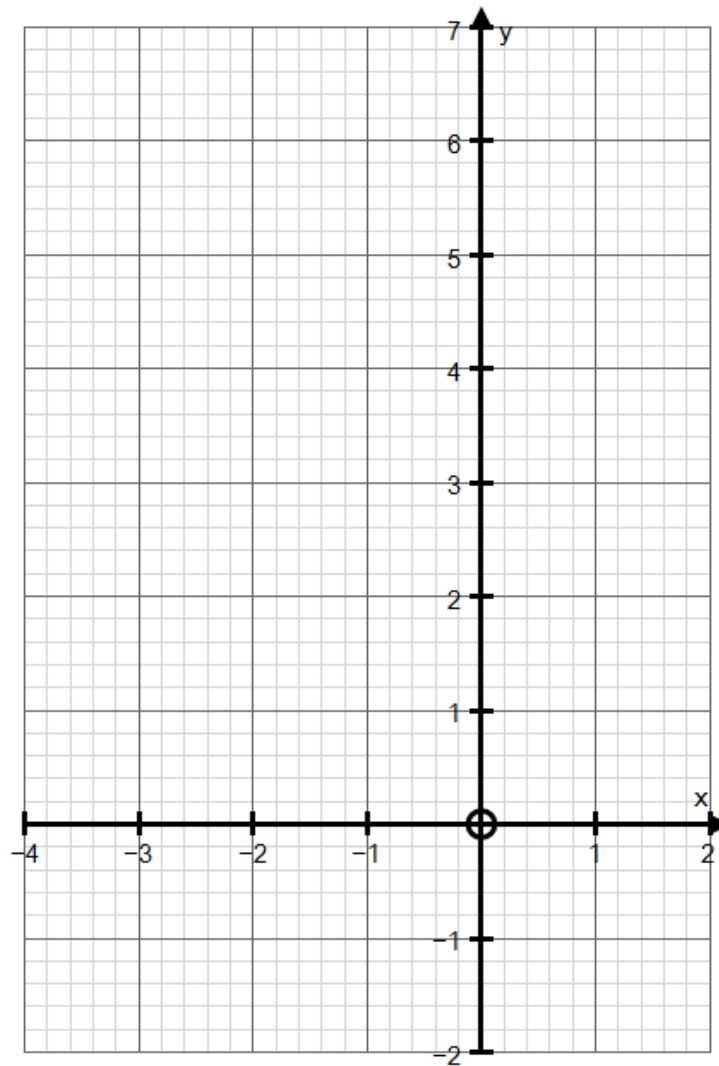
(a) $(x+3)(x-6) =$

(b) $(x-5)^2 =$

_____ (5 marks)

21.

(a) Complete the table for the graph of $y = x^2 + 2x - 1$

x	-4	-3	-2	-1	0	1	2
x^2	16				0		4
$2x$	-8		-4				4
-1	-1			-1			-1
$y = x^2 + 2x - 1$	7						7

(b) Using a scale from -4 to 2 on the x axis and -2 to 7 on the y axis, draw the graph.
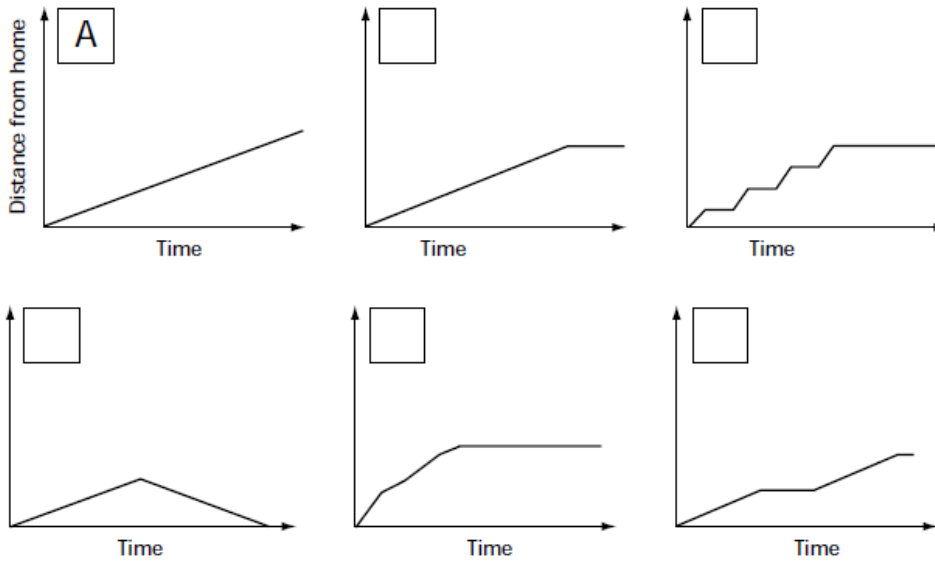

_____ (8 marks)

22. Here are 6 statements:
   A I walked to school.
   B I came to school by bus.
   C I cycled to school.
   D I cycled halfway to school, then my chain came off. I had to fix it before going on.
   E I set off walking felt ill, stopped and went home again.
   F I got a lift to school in the car.
   Match the statements to the graphs. One has been done for you.

_____ (5 marks)