1. Paula was working out the mileage cost of hiring a van for a day.

She used the formula: $\quad$ Mileage Cost $=$ Miles Travelled $\times$ Mileage Rate

The mileage rate was 6 pence per mile. The mileage cost came to $£ 9.60$.
a) How many miles had Paula travelled?

Paula worked out the total hire cost by using the formula:

## Total Hire Cost $=$ Standard Charge + Mileage Cost

The total hire cost came to $£ 44.60$
b) Work out the standard charge. 4 marks
2. Work out $3-\sqrt{64} \quad 1$ mark
3. Solve the equations-
a) $7 x+3=-18$
b) $3 q-5=2 q+4 \quad 4$ marks
4. On graph or squared paper draw the graph of $y+x=9$
5. Work out a formula for the perimeter and area of the rectangle.
6.

Work out:
(a) $3^{2}$
(b) $5^{3}$
(c) $10^{5}$

3 marks

7. a) Estimate the answer to the following $\frac{48.2+32.8}{3.2 \times 8.7}$
b) Calculate an exact decimal equivalent of $\frac{7}{8}$
8. Calculate $5 \%$ of $£ 267$.

Give your answer to a) The nearest pound.
b) The nearest penny.
9. The drawing shows a three dimensional solid. The solid is made of cubes of side 1 cm .


On squared paper, draw front and side elevations of this solid. Label each elevation.
10.


The triangle A has been marked on the grid. The coordinates of the vertices of A are $(-1,1),(-2,1),(-2,3)$. Copy the diagram.
(a) Rotate triangle $\mathbf{A}$ through one quarter turn clockwise about the origin. Label the image B .
(b) Reflect triangle B in the $x$-axis. Label this image C.
(c) Triangle $\mathbf{C}$ can be mapped onto triangle $\mathbf{A}$ by a single transformation.

Describe the transformation that maps C onto A .
7 marks
11. By dividing up a circle or otherwise construct a regular octagon.
12. A box contains many pieces of card. Each piece of card has a number written on it.

The numbers on the card are either 1,2 , or 3 .
When a piece of card is picked at random from the box, the probability that it is has a 1 written on it is 0.2 . The probability that it has a number 2 written on it is 0.3 .
a) What is the probability of picking a card with the number 3 written on it?

There are 120 pieces of card in the box.
b) Work out how many cards there are with the number 1 written on them.
13. 18 pupils from a class took a maths test. They scored the following results.

| 16 | 17 | 18 | 19 | 20 | 22 |
| :--- | :--- | :--- | :--- | :--- | :--- |
| 23 | 25 | 33 | 35 | 37 | 37 |
| 40 | 45 | 46 | 48 | 51 | 51 |

John begins to draw a stem and leaf diagram.

| Stem | Leaves |  |  |  |  | Frequency |  |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 10 | 6 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

(a) Copy and compete the stem and leaf diagram to show these results. 4 marks
(b) What information does the stem and leaf diagram show, that a grouped frequency chart does not?
14. There are 50 trillion cells in the average human.

A trillion is $1,000,000,000,000$.
a) i) Write a trillion in standard index form.
ii) Write the average number of cells in a human in standard index form.

The area inside the orbital path of Pluto is 36 quintillion square miles, where a quintillion is $1 \times 10^{18}$.
b) Assuming the orbital path is circular, estimate the radius of the orbital path.

Use 1.5 as an estimated value for $\sqrt{ } \pi$.


5 marks
15. a) Display the inequality $-1 \leq x<3$ on a number line.

Solve the inequalities
b) $\quad$ i) $\quad-1 \leq 2 x+4$
ii) $\quad-1<-2 x$

6 marks
16. Calculate the missing lengths $\boldsymbol{x}$ and $\boldsymbol{y}$, giving your answer exactly.


5 marks
17. A rhombus has side of 5 cm and a smallest angle of $40^{\circ}$. Using the estimate $\cos 20^{\circ} \approx{ }^{94} / 100$, calculate the length of the longest diagonal of the rhombus.

18. a) Work out the highest common factor of 112 and 64
b) Work out the lowest common multiple of 112 and 64 . 4 marks
19. An ink blot is spilt on some tissue paper and ink blot has an area of approximately $0.16 \mathrm{~cm}^{2}$.
a) Calculate the area of the ink plot in square millimetres.

The volume of ink spilt to create the blot is approximately $0.032 \mathrm{~cm}^{3}$.
b) What is this volume, in cubic millimetres?
c) Assuming the blot penetrates the tissue paper to an equal depth, estimate the depth of the ink penetration in mm .

5 marks
20. Write down the reciprocal of:
a) 17
b) $\frac{1}{3}$
c) $\quad-\frac{2}{3}$

3 marks
21. John throws two four sided dice and adds the scores. He throws the pair of dice 200 times and uses his results to work out experimental probability. He also works out the theoretical probabilities.
a) Copy and complete the table of probabilities.
b) Calculate the number of times his sum was 8 . 5 marks

| Sum of the <br> two dice | Experimental <br> Probability | Theoretical <br> probability |
| :---: | :---: | :---: |
| 2 | 0.07 | $1 / 16$ |
| 3 | 0.14 |  |
| 4 | 0.2 |  |
| 5 |  |  |
| 6 | 0.24 |  |
| 7 | 0.15 |  |
| 8 | 0.04 | $1 / 16$ |

22. Bag A has green and red balls in it, in the ratio 3:1
respectively.
Bag $B$ has green and red balls in it, in the ratio 5:3 respectively.
The same number of balls are in Bags A and B.
a) Calculate the least number of balls in bag $A$.

BAG A
BAG B
A ball is selected from each bag.
The diagram shows the part of a tree diagram.
b) Calculate the probability that both balls selected are red.


The number of balls in bags A and B is changed but the ratio of balls remains $3: 1$ and $5: 3$ as before. Bag C has green and red balls in it, in the ratio 5:1 respectively.
The same number of balls are in Bags A, B and C.
c) Calculate the least number of red balls that are contained altogether in the three bags. 8 marks
23. Match-up the five sketch graphs to the five suggested curves,
i) Quadratic with a minimum point
ii) Reciprocal
iii) Quadratic with a maximum point
iv) Cubic
v) Linear

As an example, the graph labelled i) is a quadratic function.

a)

b)

c)

d)

e)

