1. Anita thinks of a number and trebles it.
a) If her answer is 99 what did she start with?
b) If she started with $x$ what did she end up with?
2. A box has a width of 3 cm , a length of 4 cm and a height of 5 cm .
a) Calculate the volume of this box.
[2]
There are many boxes like this one, all of the same size.
They all have a width of 3 cm , a length of 4 cm and a height of 5 cm . These boxes are placed onto a crate.
The boxes are stacked so that they are 5 cm high, as shown.

b) How high are the boxes stacked?
[1]

An empty crate has a width of 30 cm , and a length of 40 cm .
The boxes fit exactly into the crate.
3. $\quad 0.02 \quad 1.1 \quad 1.021 \quad 2.10 \quad 0.0123$
a) List these numbers from smallest to largest.
b) Subtract the smallest number from the largest.
4. a) The sticker price of the French Horn is $£ 39$ How much is the French Horn after the sale?

b) Find an approximate answer to: $999 \times 43$ Show all your working carefully for this question.
5. a) Name the shape ABCDEF .


The shape has rotational symmetry of order 2 and 2 lines of symmetry as indicated with dashed lines. The shape is re-constructed by moving point $\mathrm{B}, 1 \mathrm{~cm}$ to the right. One other point is also moved 1 cm . Which other point was moved and in which direction, if the new shape has:
b) a vertical line of symmetry and no rotational symmetry?
c) a horizontal line of symmetry and no rotational symmetry?
d) no lines of symmetry but does have rotational symmetry of order 2?
6. a) Sketch the net of a square-based pyramid. John makes this square-based pyramid.
He uses five pieces of card.


He uses four triangles, made of card, and one other piece.
The four triangles are like this one.
b) Draw accurately and to scale the missing piece of card.

You do not need to show flaps.
7. a) Draw the accurate net of a 6 -sided cube whose sides are all 3 cm long.

The whole surface of the cube is painted.
b) What area will be painted?
8. Simplify the expressions:
a) $2 a+3-a+1$
b) $a^{4} \times a^{2}$
c) $2 a \times 5 b$

Solve the equation:
d) $2(x+2)=10$
9. Evaluate:
a) $\quad 3^{3}$
b) $\quad 6^{2}$
b) $6^{2}$
10. A survey is carried out on 17 people in Summer and on some different people in Winter.

The survey involves both children and adults.
The people surveyed are summarised in this table:

|  | Children | Adults |
| :---: | :---: | :---: |
| Summer | 10 | 7 |
| Winter | 8 | 15 |

a) How many children were surveyed?
b) How many adults in winter were surveyed?

One of the people surveyed is selected at random.
c) What is the probability that the person is a child? Give your answer in its simplest form.
d) What is the probability that the person was surveyed in winter? Give your answer in its simplest form.
11. a) Copy and complete the table and use these values to draw the graph of $\mathrm{y}=2 x+1$

| $x$ | 1 | 2 | 3 |
| :---: | :---: | :---: | :---: |
| $2 x+1$ |  |  |  |

Copy this or use your own scale to draw your graph.

b) Use your graph to work out $x$ when $y$ is 4 .
12.


| Planet | Distance to sun (km) |
| :--- | :--- |
| Earth | $150 \times 10^{6}$ |
| Saturn | $143 \times 10^{7}$ |


a) Write down the distance of the sun from earth in standard index form.
b) How far is the total distance from the earth to the sun and then to planet Saturn.

Give your answer in standard index form.
3 marks
13. Jim plots the price of 20 cars against the age of the car. All 20 cars are the same make and model and were made between 1980 and 1990. The older cars are worth less money. For each year the car was made before 1990 the value on average drops by about $£ 100$.
a) Sketch a scatter diagram which shows the likely correlation.
b) Describe the correlation.
c) Sketch a scatter diagram which shows perfect linear correlation.

3 marks
14. Calculate each of the following
a) $\quad 0.4^{3}$
b) $\quad 0.02^{3}$
c) $\frac{1}{4}+1 \frac{1}{5}$
d) $2 \frac{1}{4} \div 3 \frac{1}{5}$
e) $\quad 2.4 \times 10^{-4} \times 2.0 \times 10^{6}$
5 marks
15. a) Construct using a straight edge and compasses an equilateral triangle of side 8 cm .

Jim ties his goat to a post with an 8 m rope in an L-shaped field. The post is marked A. The field is bounded by a tall fence and the corners of the field with tall posts. Neither the goat nor the rope can leave the field.

b) i) Using a scale of 1 cm to 2 m reproduce the diagram accurately. You can use square cm paper.
ii) Shade on your diagram the largest area the goat can reach inside the field. 7 marks
16. Anita thinks of a number $\boldsymbol{y}$, trebles it, adds 45 and gets the result $\boldsymbol{x}$.
a) Work out an equation that links $\boldsymbol{x}$ and $\mathbf{y}$.

Tom starts with Anita's answer $\boldsymbol{x}$ and subtracts 27.
He ends up with the number Anita started with.
b) i) Work out a $2^{\text {nd }}$ equation linking $\boldsymbol{x}$ and $\mathbf{y}$.
ii) Hence or otherwise calculate the number that Anita started with.
6 marks
17. The following pentagon has one line of symmetry as shown.

Calculate angle $x$.

18. Simplify
a) i) $3 p^{3} \times 2 p^{3}$
ii) $\frac{9 r^{4}}{6 r^{3}}$
b) i) Rearrange the equation $m=2 r+3 s t$, making $r$ the subject.
ii) If in the equation $m=2 r+3 s t, r=-3, s=-4$ and $t=-5$, find $m$.
19. $\mathrm{ABC}, \mathrm{DEF}$ and CEG are similar triangles.

AB and EG are parallel with the distance between them 1 cm .

a) i) Find the length BC, leaving your answer in the form $\sqrt{ } n$, where $n$ an integer.
ii) Simplify your answer $\sqrt{ }$ n into the form $\mathrm{p} \sqrt{ } \mathrm{q}$, with p , and q are integers.
b) Calculate the lengths EF and EG.
c) i) Which angle in the diagram is equal to $\angle \mathrm{EDF}$ ?
ii) Given that $\tan x=r$, find $r$.

7 marks
20. In 2002 Jim records his first 5 golf scores as 68, 70, 71, 71, 73.

Jim records his scores in date order, so the 68 was his first score, 70 his second, etc.
a) Calculate his average score.

Jim then records his next 4 scores, in date order, as 68707168 .
b) Calculate the moving average based on 5 games at a time.

3 marks
21. a) Factorise the expression, $x^{2}-x-6$ and hence solve the equation $x^{2}-x-6=0$.
b) Solve the equations:
i) $2(x+2)=x$
ii) $\quad \frac{2}{3} x=19$
c) Solve the inequality, $2-3 x<17$

