DO NOT WRITE ON THIS PAPER	TIME 2 hours	Paper 8 of 10 from ZigZag Education
Sample GCSE Examination Paper **Higher Tier Non-Calculator Paper**	Standard Equipment: lined or squared paper, pen, pencil, ruler. Additional Equipment: graph paper(Q3, Q7). Special Notes: Rubber to remove markings for Q8.	

1. Calculate:
    a)   i) $(-7)^2 + 1$ ii) $1-2(-2-(-3))$
    b)   Write $2/11$ as a recurring decimal.
    c)   i)   Evaluate $0.001234 \div 2$ and write your answer in standard form.
         ii)   Calculate $\dfrac{1.8 \times 10^8}{6}$ and write your answer in standard form

                                                                                          7 marks

2. a)   A car would normally cost £ x.
         The salesperson offers a 20% discount for customers paying by cash.
         How much in terms of x is the car after the cash discount?

    Write down a formulae to represent the nth term of sequences i) and ii).
    b)   i)   5, 10, 15, 20,...   ii) $2/3, 3/4, 4/5, 5/6,...$ 4 marks

3. The following heights were recorded during an experiment concerning plant growth.

Height in cm	Frequency
$10 < h \le 20$	1
$20 < h \le 30$	5
$30 < h \le 40$	8
$40 < h \le 60$	4
$60 < h \le 80$	12

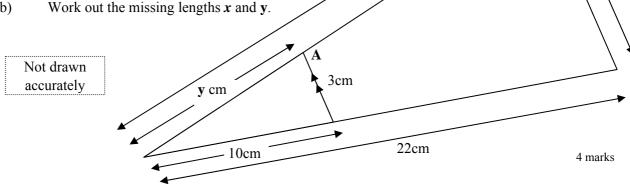   a)   Copy and complete the cumulative frequency table below and draw the cumulative frequency
         diagram.   7 marks

Height in cm	Cumulative Frequency
$h \le 10$	
$h \le 20$	
$h \le 30$	
$h \le 40$	
$h \le 60$	
$h \le 80$	

    b)   Estimate the median from your graph.

4. a)   Write down a formula that must be true
         linking angle **A** with angle **B**.
    b)   Work out the missing lengths x and y.

    Not drawn accurately

    23.1cm

    B

    x cm

    A

    3cm

    y cm

    10cm   22cm   4 marks

5. The following was produced by the function, $\mathbf{a}n^2 + \mathbf{b}$, with $\mathbf{a}$ and $\mathbf{b}$ both as constants.
    Find $\mathbf{a}$ and $\mathbf{b}$.   4 marks

Input, n	Output, $\mathbf{a}n^2 + \mathbf{b}$
0	10
1	12
2	18
3	28
4	42

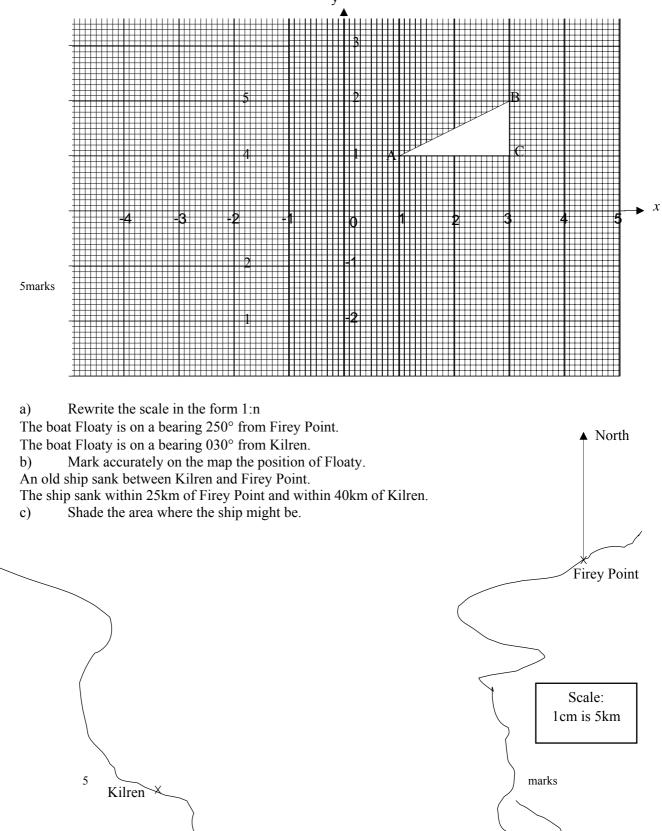6.   a)   Jane thinks of a number adds 4 and then doubles her result.
            i)   If Jane ends up with 100 what did she start with?
            ii)   If Jane ends up with **y** what did she start with?
                  Tom ends up with a number twice as big as the number Jane ended up with, in part ii).
            iii) Write down a formulae in **y** for the number Tom ended up with.   3 marks

7.   a)   Reflect the triangle ABC in the line y = *x* and label your new triangle A'B'C'.
      b)   Rotate the <u>original</u> triangle ABC, about the origin, 90^0 clockwise. Label your new triangle A"B"C"
      c)   Enlarge the <u>original</u> triangle ABC by a scale factor 2, using (2,3) as the centre of enlargement.
            Label your new triangle A'''B'''C'''.
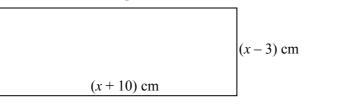

5marks

8.   a)   Rewrite the scale in the form 1:n
      The boat Floaty is on a bearing 250° from Firey Point.
      The boat Floaty is on a bearing 030° from Kilren.
      b)   Mark accurately on the map the position of Floaty.
      An old ship sank between Kilren and Firey Point.
      The ship sank within 25km of Firey Point and within 40km of Kilren.
      c)   Shade the area where the ship might be.

North

Firey Point

Scale:
1cm is 5km

5   Kilren ✕

marks

9. a) Solve the simultaneous equations $\quad 2x + 3y = 30$
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad -3x + 5y = 64$

   b) In graphical terms, what does the solution to the simultaneous equations represent. 6 Marks

10. The area of these two shapes is the same.

$(x - 3)$ cm

$(x + 10)$ cm

$(x + 3)$ cm

$(x + 3)$ cm

   a) Formulate an equation in x, and solve the equation.
   b) Write down the area of the square. 5 Marks

11. The following heights were recorded during an experiment concerning plant growth.

Height in cm	Frequency
$10 < h \le 20$	1
$20 < h \le 30$	5
$30 < h \le 40$	8
$40 < h \le 60$	4
$60 < h \le 80$	12

   In drawing a histogram, what heights would you make each bar? (Do **not** draw the histogram). 3 marks
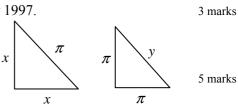
12. Write $0.2\dot{0}\dot{3}$ as a fraction in the form $\dfrac{a}{b}$, with a, b integers. (Do not try to cancel your fraction). 3 marks

13. Express as a single fraction:
   a) $y/2 + 2/3$
   b) $y/2 \div y/3$
   c) $3/y - (y/2 - 1/y)$ 4 marks

14. The following was produced by the function, ab^n, with **a** and **b** constants.
   Find **a** and **b**. 2 marks

Input, n	Output, ab^n
0	4
1	12
2	36
3	108
4	324

15. The population of Africa increases at a yearly rate of 3%.
   The population is 760 million in 1997.
   a) Calculate the population in 1998.
   b) Formulate an expression for the population **n** years after 1997. 3 marks

16. Find x and y in the following isosceles triangles leaving your
   answers simplified and exact, and rationalising any surds
   in your answer.

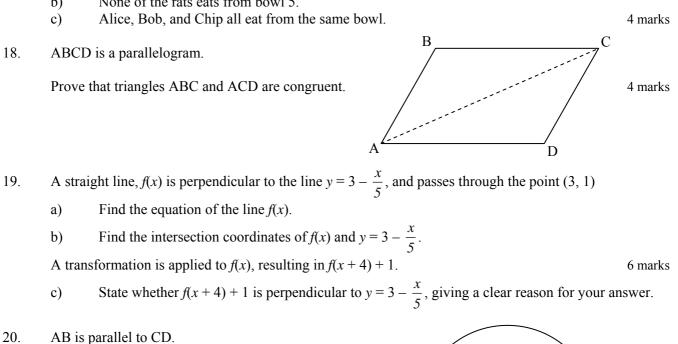 x $\quad \pi$ $\quad x$ $\quad \pi$ $\quad y$ $\quad \pi$ 5 marks

17. Three rats called Alice, Bob, and Chip choose randomly and independently between 5 food bowls, numbered 1, 2, 3, 4 and 5.

Calculate the probability that–
a) Bob and Chip both eat from Bowl number 2.
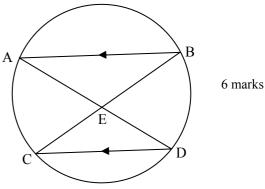b) None of the rats eats from bowl 5.
c) Alice, Bob, and Chip all eat from the same bowl. 4 marks

18. ABCD is a parallelogram.

Prove that triangles ABC and ACD are congruent. 4 marks

19. A straight line, $f(x)$ is perpendicular to the line $y = 3 - \dfrac{x}{5}$, and passes through the point (3, 1)

a) Find the equation of the line $f(x)$.

b) Find the intersection coordinates of $f(x)$ and $y = 3 - \dfrac{x}{5}$.

A transformation is applied to $f(x)$, resulting in $f(x + 4) + 1$. 6 marks

c) State whether $f(x + 4) + 1$ is perpendicular to $y = 3 - \dfrac{x}{5}$, giving a clear reason for your answer.

20. AB is parallel to CD.

Prove that–
a) Angle AEC = 2 × ABC
b) AE = BE 6 marks

21. a) Rearrange the equation $6x - 12 = x^2 + 2$ into the form $(x + p)^2 = q$, with p, and q integers and find p and q.

b) Use your result from part a) to consider the x-coordinate of an intersection between $y = 6x - 12$ and $y = x^2 + 2$ and interpret this graphically. 5 marks

22. The diagram to the right shows a square based pyramid VABCD.
V is directly above M, the midpoint of the square base.

Calculate exactly–
a) BD
b) VM 5 marks