SENIOR PHASE

GRADE 9

NOVEMBER 2013

MATHEMATICS

MARKS: 100

TIME: 2 hours

This question paper consists of 16 pages including annexures.

INSTRUCTIONS AND INFORMATION

1.   Answer all the questions.

2.   Write neatly and legibly.

3.   Do not change the numbering of the questions.

4.   Show all your calculations, correct your answer to TWO decimal places where necessary.

5.   A non-programmable calculator may be used.

QUESTION 1

In this question, FOUR possible answers are given for each question. **Write only** the correct letter for the correct answer you have chosen next to the corresponding question number. Do not rewrite the question.
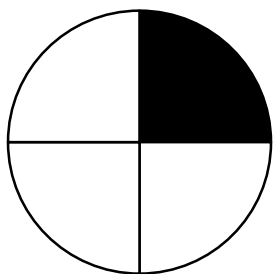
EXAMPLE :

e.g.   1.11 $\dfrac{1 + 2 + 3 + 4}{1 \times 2 \times 5}$ is:

    A   0   B   1   C   2   D   3
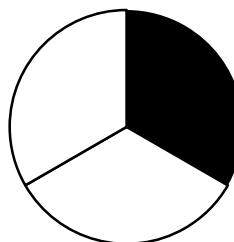
The correct answer is 1 which is letter B.

Answer: 1.11 B

1.1   The circles below are divided into parts. When the shaded in circle 1 is added to the shaded part in circle 2, their sum is equivalent to:

Circle 1   Circle 2

    A $\dfrac{2}{7}$

    B $\dfrac{1}{2}$

    C $\dfrac{2}{5}$

    D $\dfrac{7}{12}$

                       (1)

1.2   How many numbers from 11 to 69 have the sum of their digits as a square number?
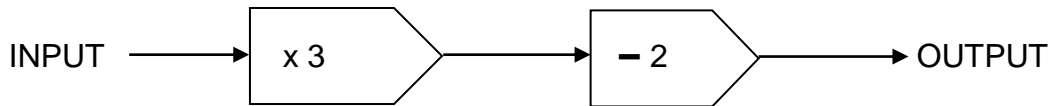
    A   14
    B   15
    C   10
    D   17   (1)

1.3   The seventh term in the sequence 1; 7; 17; 31; 49; … is:

     A   96
     B   97
     C   98
     D   99   (1)

1.4   In the machine below the output value is 19. What is the input value?

     INPUT ⟶ x 3 ⟶ − 2 ⟶ OUTPUT

     A   13
     B   55
     C   25
     D   7   (1)

1.5   Which of the following is a solution to $2x + y = 5$?

     A   (0 ; 3)
     B   (-2 ; 1)
     C   (5 ; -5)
     D $(-\frac{1}{2} ; 6)$ (1)

1.6   In two years' time Thandile will be $\frac{1}{3}$ the age of the elder sister. If her sister is 34 years at the moment then Thandile's age at the moment is …

     A   2 years.
     B   11 years.
     C   12 years.
     D   10 years.   (1)

1.7   Bonga has a sheet of cardboard, he wants to cut it into pieces to make a rectangular pyramid. He will cut the following pieces:

     A   Four rectangles and two squares
     B   Two rectangles and four squares
     C   Three rectangles and one triangle
     D   One rectangle and four triangles   (1)

1.8 A type of a polyhedron (3-dimensional object) has 12 edges; 8 vertices and 6 faces. Which of the formulae given below for working out the number of edges is incorrect?

   A   E = (V + F) – 2
   B   E = (V – 2) + F
   C   E = (V – F) + 2
   D   E = (F – 2) + V   (1)

1.9 From the information given below, choose the form of transport that uses the least fuel/petrol.

   A   A truck uses 40 litres of fuel for 200 km
   B   A car travels 500 km on 50 litres of fuel
   C   A bus uses 30 litres of fuel to travel 165 km
   D   A Rocker motorcycle travels 450 km on 22,5 litres of petrol   (1)

1.10 The average of the given numbers $\{1; \ 2; \ 5\frac{3}{5}; \ 12; \ 6\frac{1}{10}; \ 10\}$ is:

   A   6,98
   B   6,93
   C   6,12
   D   6,75   (1)

                                                                              [10]

QUESTION 2

2.1 Some Eastern Cape schools are experiencing a problem in submitting documents on time to their relevant district offices because of lack of suitable transport to suit the road conditions. The price of the new car to suit the road conditions is R315 000. The value of a car depreciates by 7% every year.

   2.1.1   If the Eastern Cape government has to provide all its schools with cars and change them after every period of three years, what will be the value of a car be after 3 years?   (3)

   2.1.2   Suppose the government may need to pay an interest (SI) of R39 500 in 3 years' time. Work out the interest rate of the car that is sold for R315 000.   (3)

2.2 A certain school has 720 pupils. The ratio of the number of senior pupils to the number of junior pupils is 4 : 5.
How many junior pupils are there in the school?   (2)

2.3 Kenneth has to divide R1 300 among his 3 workers A, B and C. Worker A must get R200 more than worker B, and worker B must get R100 more than worker C. What will worker C get?   (2)

                                                                              [10]

QUESTION 3

3.1 Copy and complete the table below which shows the conversion of degrees in celsius to degrees in fahrenheit.

TABLE 3.1

ºC		0	20	40	60	80
ºF $= \frac{9}{5}$ ºC + 32		32	68	104		

(2)

3.2 Use ANNEXURE 1 to draw the graph illustrating the information in TABLE 3.1. (2)

3.3 During school holidays Teddy assists his uncle who is working with steel. One day he thought of using the waste steel material to make racks for placing hot pots. He bought nails, cut pieces of steel and joined them one by one forming hexagonal patterns as shown below. (3)
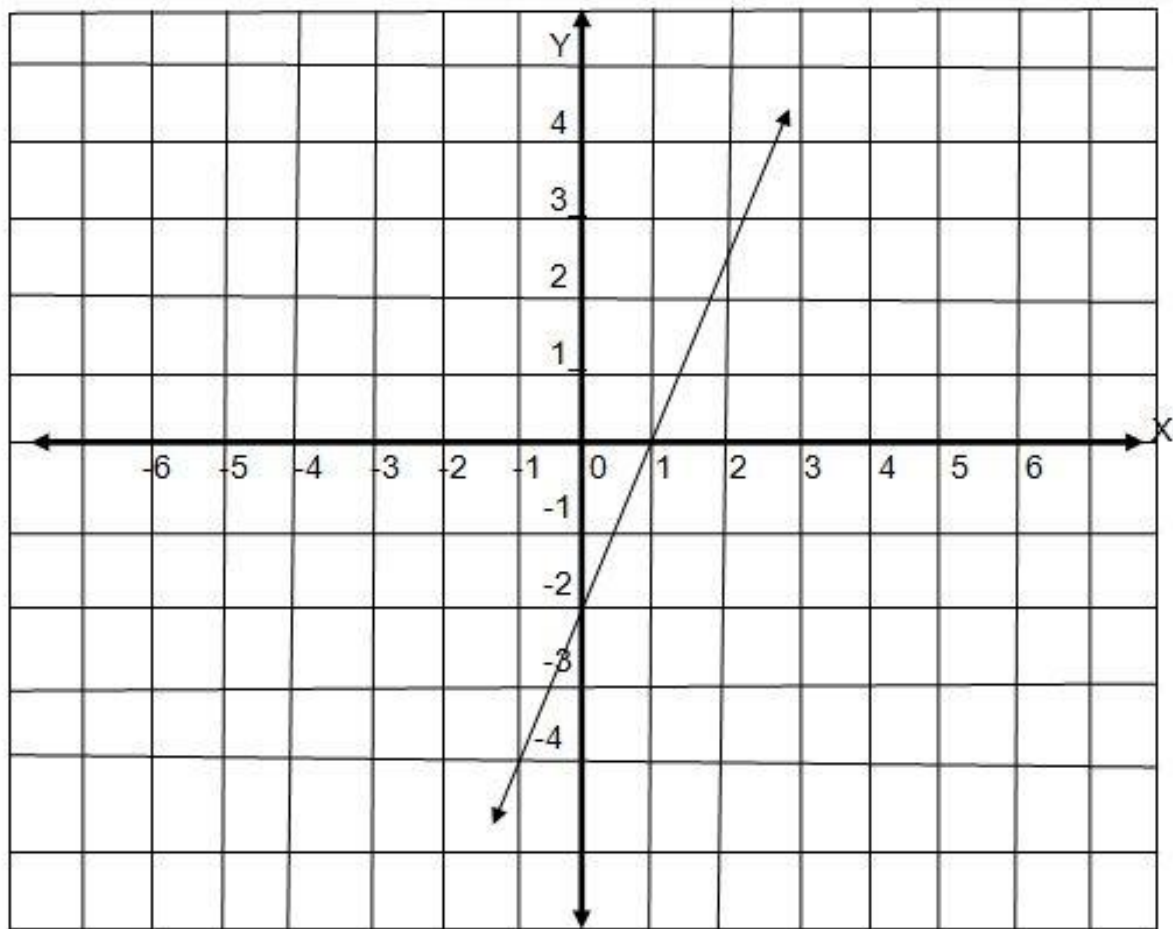

rack 1   rack 2   rack 3   rack 4
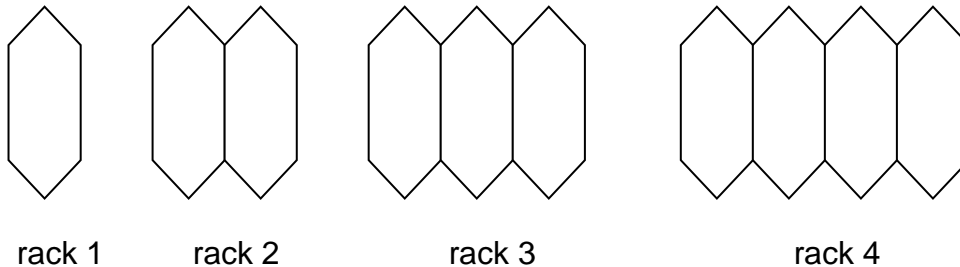
The table below shows the relationship between the rack number and the number of joined pieces.

Rack no.		1	2	3	4	*n*
Number of pieces		6	11	16	21	

3.3.1 Determine the general rule for the number of steel pieces. (2)

3.3.2 What rack number can Teddy develop using 46 pieces? (2)

3.4   Study the graph below and then determine the equation.

(2)
[10]

QUESTION 4

4.1   Factorise completely:

4.1.1 $24x^3y^2 - 8x^2y - 16x^2y^2$ (2)

4.1.2 $m^2(m - 2) - 4(m - 2)$ (3)

4.2   Solve for x in the equations below:

4.2.1 $4x - (3x - 7) - (2x - 3) = 8(x - 1)$ (3)

4.2.2 $\dfrac{x^2}{x^2 - 3x} = \dfrac{x - 3}{x - 5}$ (4)

4.2.3 $2^{4x} = 256$ (2)
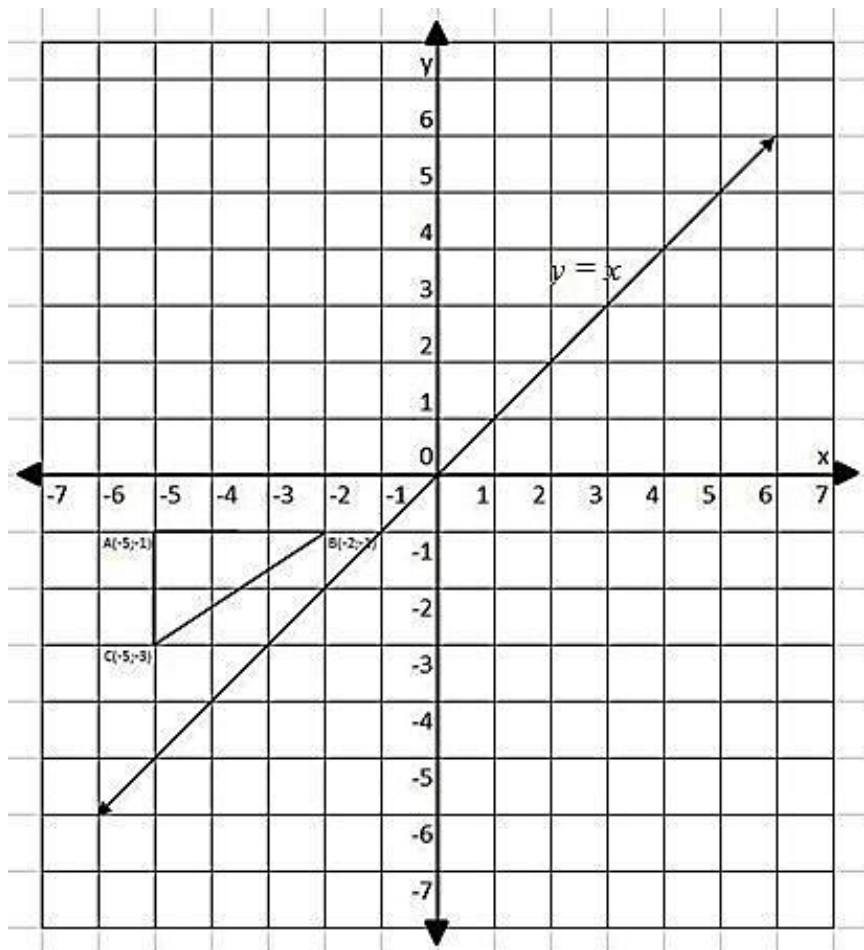
4.3 Simplify:

4.3.1 $3^{2n+3} \cdot 3^{-n-5}$ (2)

4.3.2 $\dfrac{15a(ab)^2}{7c^5} \div \dfrac{5ab}{21c^3}$ (3)

4.3.3 Using $x^2 - (x + 2)(x - 2)$ or otherwise,
determine $(54\ 321)^2 - (54\ 323)(54\ 319)$ (2)

[21]

QUESTION 5

5.1 Use ANNEXURE 2 to answer the following questions.


5.1.1 Reflect $\triangle$ABC in the line $y = x$ in the same quadrant. (2)

5.1.2 What is the general rule of the reflection in the line $y = x$? (1)

5.1.3 Translate the reflected image 4 units to the right. (1)

5.2   Two similar triangles are formed by two different ladders of lengths 10 m and 18 m
       that are leaning against a wall, such that they make the same angle with the ground.
       The 10 m ladder reaches 8 m up the wall. How much further up the wall does the
   18 m ladder reach?
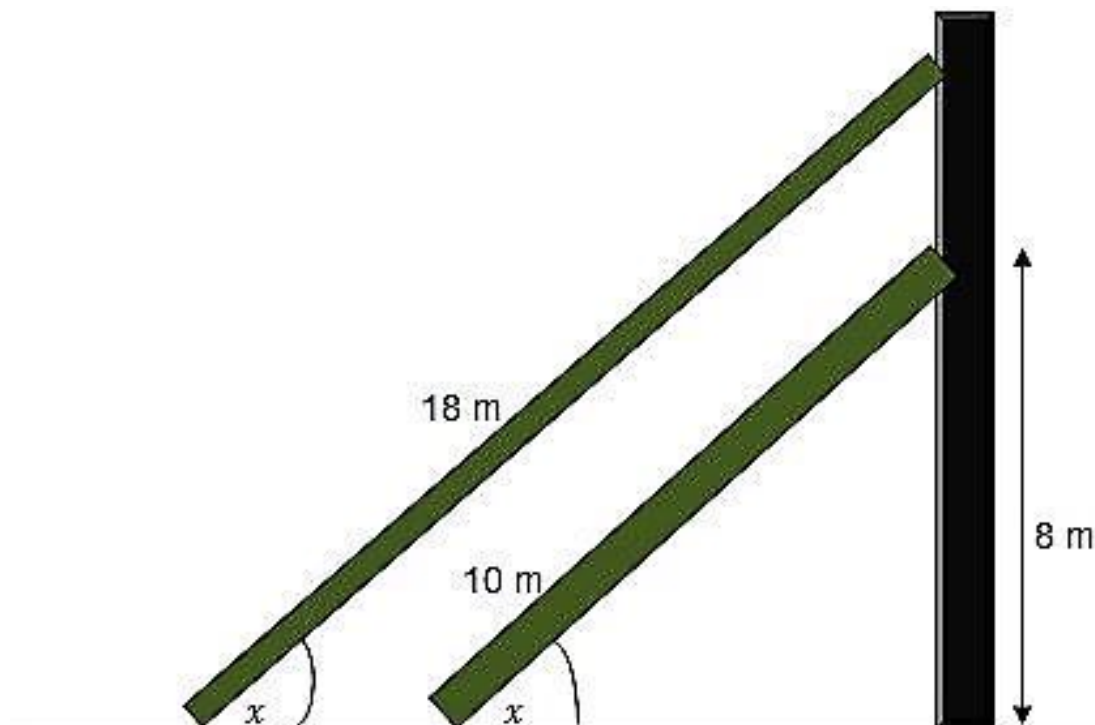
                                                                                          (3)

5.3   Carefully study the figure below which shows the first two steps of tessellating the
       triangle and then answer the questions that follow.
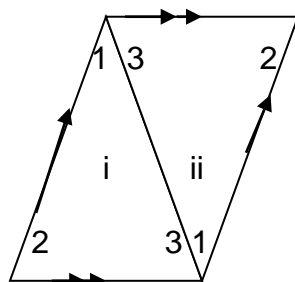
       5.3.1   Complete the tessellation step iii and step iv.   (2)

       5.3.2   What type of quadrilateral is formed after completing step iv?   (1)

       5.3.3   Give any TWO properties of the shape you mentioned in QUESTION 5.3.2.   (2)

5.4 A *Z*-letter shape is drawn below (AB // CD) showing a pair of alternate angles.
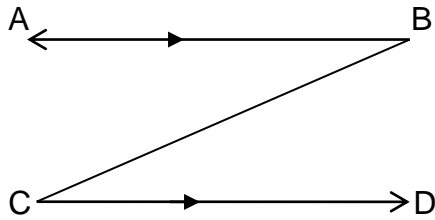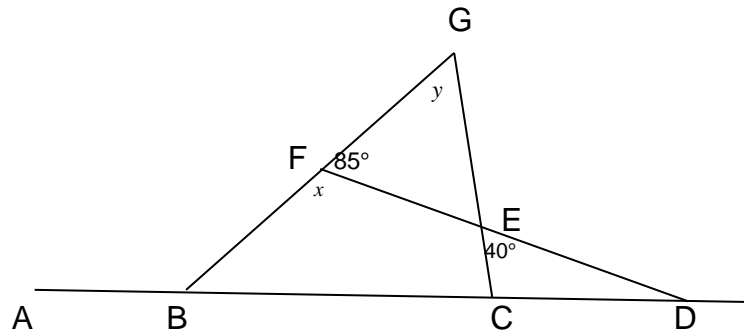

In the shape above identify the:

5.4.1 Angle of elevation (1)

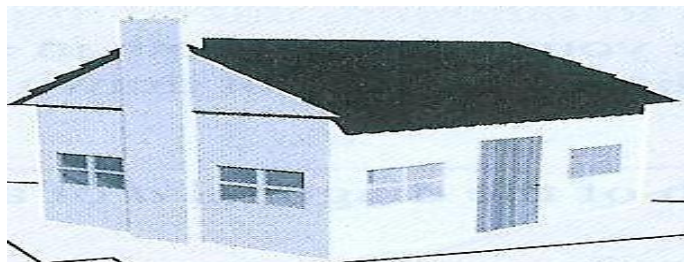5.4.2 Angle of depression (1)

5.5 Study the figure below:

AD; BG; FD and GC are straight lines. Calculate the value of *y*. (3)

[17]

QUESTION 6

6.1   The figure below represents a classroom. The four walls with the ceiling form a
        right rectangular prism with the following dimensions: length of the wall is 9 m, the
        breadth is 7 m and the height is 5 m.

        6.1.1   Determine the volume of air enclosed in the classroom.   (2)

   6.1.2   Convert your answer in QUESTION 6.1.1 to cubic centimetres.   (1)

6.2   Miso's sister lives and works in United Kingdom where they measure lengths in
        yards.

        6.2.1   Miso needs 5 metres of cloth material to sew her dress. How many yards
                  must the sister buy?
                  [Hint: 1 m = 1,094 yards]   (2)

        6.2.2   If the sister buys 8 yards of cloth material, how many metres will be left
                  after making the dress?   (2)

6.3   A triangular prism is drawn. The base is a right angled triangle with
        DF = 8 cm, FE = 6 cm and its height is 15 cm. B is joined to F.
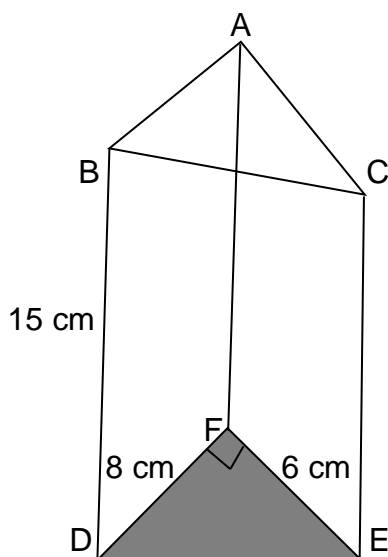
        6.3.1   Calculate the length of BF.   (2)

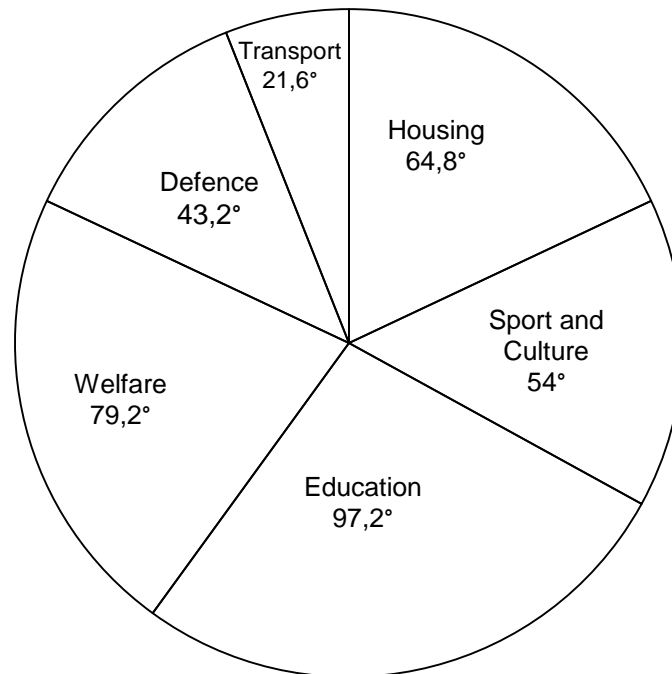   6.3.2   Show that △ FDE and △ ABC are congruent.   (4)
                                                                                                   [13]

QUESTION 7

7.1   The South African minister of finance allocated R9 billion in the 2003 budget as
        shown in the pie chart below.

        7.1.1   Work out the fraction of the circle that represents the amount
                  allocated to Defence.   (1)

        7.1.2   What percentage of the budget was allocated to Welfare and
                  Education?   (2)

        7.1.3   If the percentages for Sport and Culture, Housing, Transport and
                  Defence are 15%, 18%, 6% and 12% respectively, including the
                  answer in QUESTION 7.1.2, draw an ordered stem and leaf diagram.   (2)

        7.1.4   Calculate the mean of the percentages allocated for the departments.   (2)

7.2   South Africa has experienced a high rate of police officers killed *on duty* and
        off duty from 2002 to 2007. The information is shown below.

Year	2002	2003	2004	2005	2006	2007
On duty	93	93	86	100	101	60
Off duty	160	136	125	125	125	110

        Use ANNEXURE 3 to draw a double bar graph to show the information.   (3)

7.3   The list below are the marks obtained by learners in a Mathematics test:

44	87	57	41	45	72	67	59	45	80
53	90	75	57	86	48	38	63	76	30

Determine the:

7.3.1   Median   (2)

7.3.2   Range   (1)

7.4   Using the marks obtained by learners in the Mathematics test in
QUESTION 7.3, draw a tally-frequency table with 5 classes of equal width.
[Hint: the first class interval is 21 – 35]   (3)

7.5   Pairs of socks are neatly packed in a drawer of a wardrobe. There are 4 pairs
of black socks, 2 pairs of blue socks, 3 pairs of yellow socks and 5 pairs of
white socks. One pair of socks is taken from the drawer without looking. What
is the probability of:

7.5.1   Taking a pair of blue socks or a pair of yellow socks?   (1)

7.5.2   Not getting a pair of white socks?   (1)

7.5.3   Choosing pairs of socks from one of the odd numbered pairs?   (1)
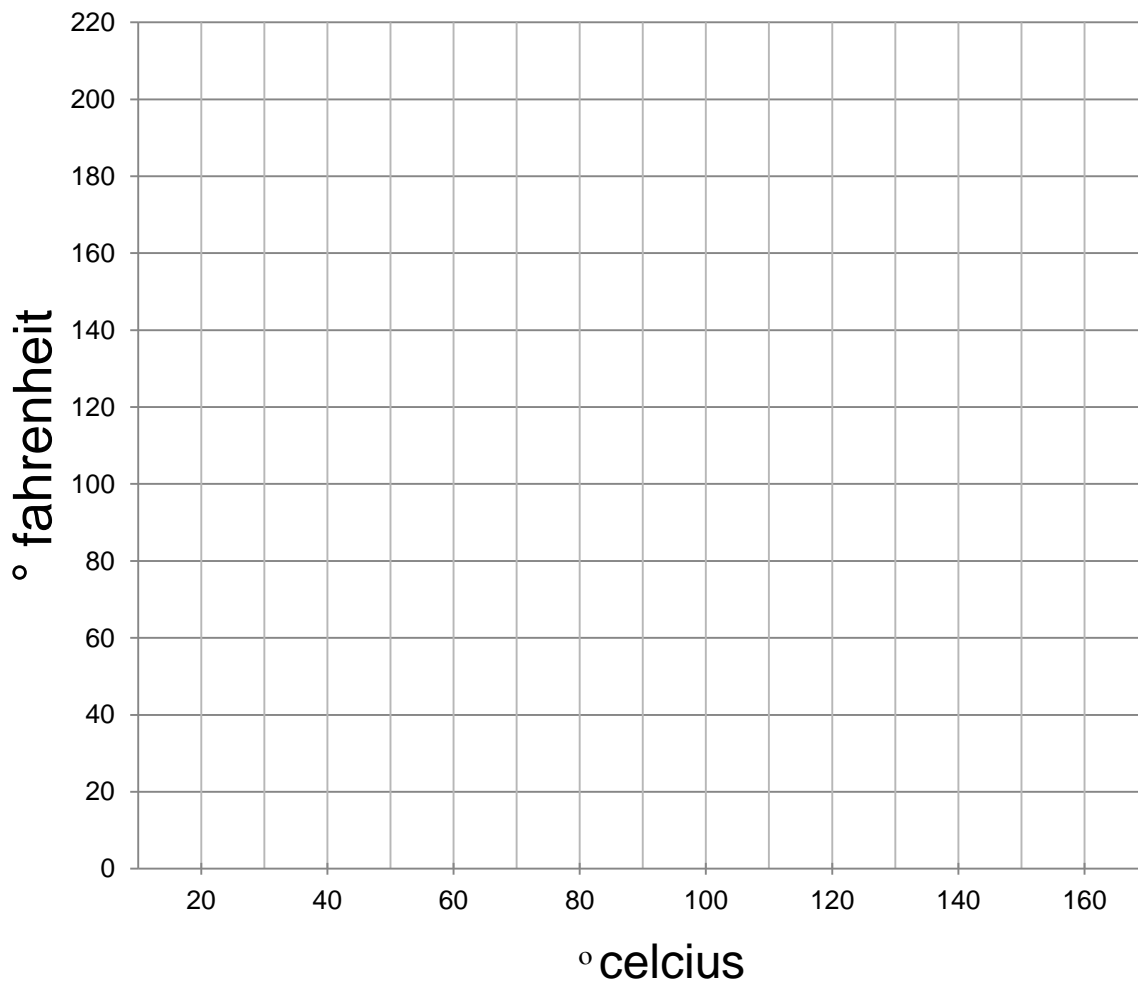   **[19]**

                                                               TOTAL: 100

ANNEXURE 1

SURNAME : _____

NAME   : _____

PROVINCE : _____

DATE   : _____

QUESTION 3.2

CONVERSION OF   ºC TO ºF

ANNEXURE 2

SURNAME : _____

NAME   : _____

PROVINCE : _____

DATE   : _____

QUESTION 5.1
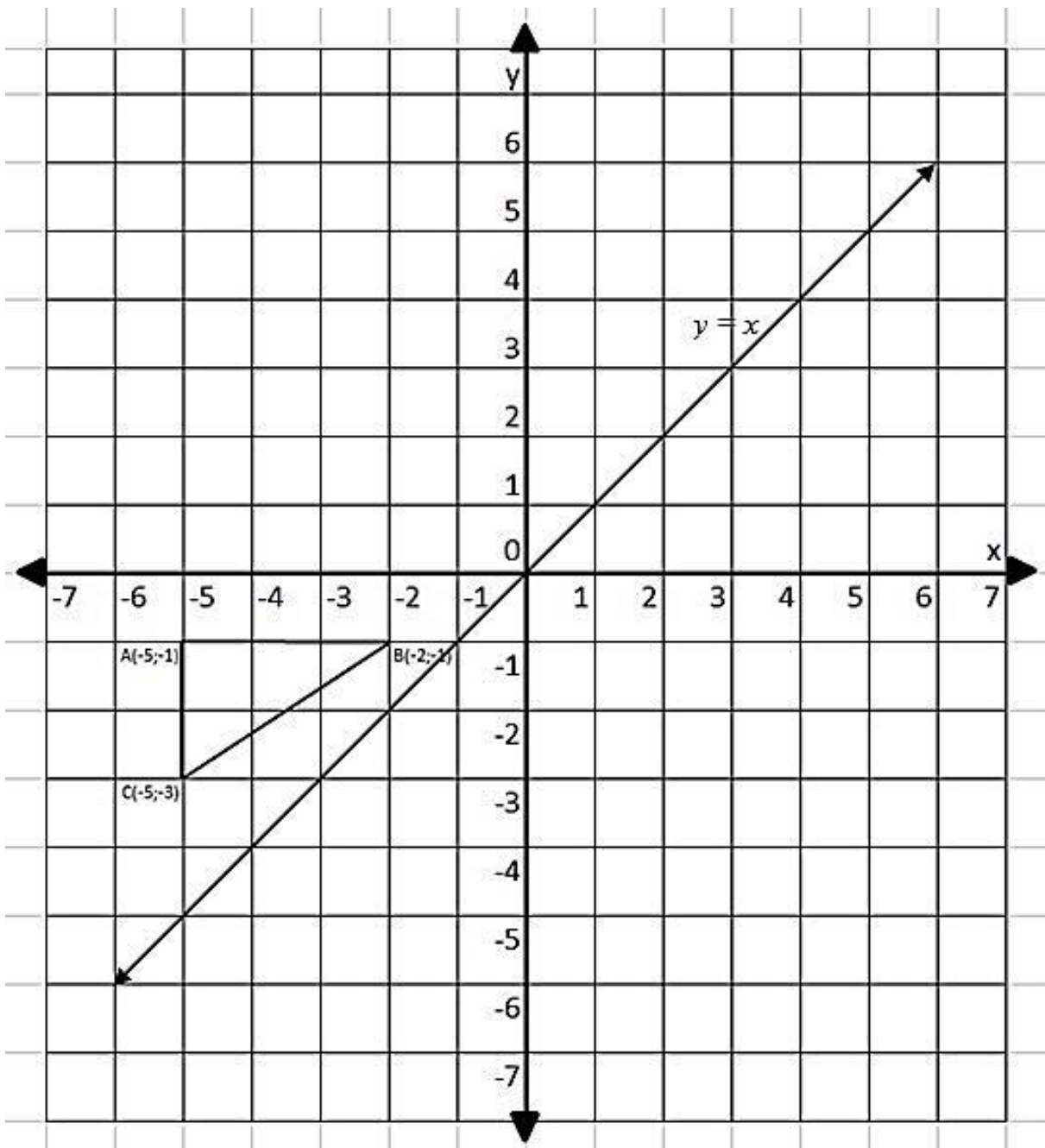
ANNEXURE 3

SURNAME : _____

NAME   : _____

PROVINCE : _____

DATE   : _____

QUESTION 7.2

POLICE OFFICERS KILLED ON AND OFF DUTY

(Grid chart with y-axis labelled NUMBER OF POLICE KILLED, scale 0 to 180 in increments of 20; x-axis labelled YEARS with values 2002, 2003, 2004, 2005, 2006, 2007)