

SHARP

November Exam
Grade 9 Mathematics

Marks: 150

Time: 2 hours

Instructions:

Read the following instructions carefully before answering the questions:

1. This question paper consists of 9 pages and two sections.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.
4. Answers only will not necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Number the answers correctly according to the numbering system used in this question paper.
9. Write neatly and legibly.

Good Luck

Section 1 - Algebra

Question 1

1.1. Given the following numbers: 360, 252, and 240.

1.1.1. Determine the prime factors of these numbers. (3)

1.1.2. Determine the HCF and the LCM of these numbers. (2)

1.2. Without the use of a calculator determine the values of the following:

1.2.1. $\sqrt{(-9)(-4)} + \frac{42}{-7}$ (3)

1.2.2. $\sqrt[3]{-27} - \sqrt{25}$ (2)

1.2.3. $3\frac{2}{5} \div 3\frac{4}{7} \div 0.35$ (3)

1.3. Henrietta and her friends, Yvonne and Kimberley, own a clothes manufacturing business together. Henrietta owns $\frac{1}{4}$ of the business, Yvonne owns 0.4 of the business and Kimberley owns 35% of the business. The rest of the business is owned by the bank.

1.3.1. How much of the business is owned by the bank? (2)

1.3.2. If the ladies decide to sell their business for R250 000, how much money will each of the ladies receive? (3)

1.4. Give the scientific notation of the following number: 3 741 360 000 (1)

1.5. Give the decimal number for the following: 5.627×10^{-5} (1)

1.6. Simplify the following, give your answer with positive exponents only: (3)

$$\frac{(x^3y^{-4})^2}{(x^2y^{-3})^{-2}} \times \frac{x^3y^0}{y^5}$$

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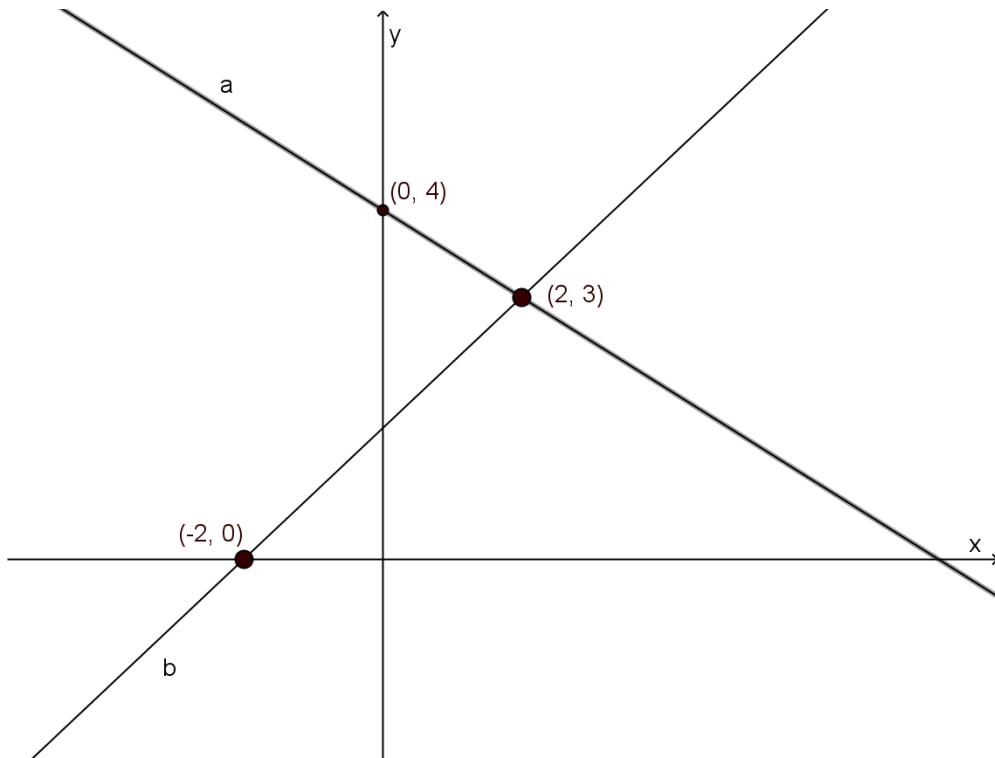
Question 2

2.1. Given the following table:

| | | | | | | | |
|-----|----|----|---|-----|-----|-----|-----|
| x | 1 | 2 | 3 | 4 | b | 9 | d |
| y | 15 | 12 | 9 | a | 0 | c | -24 |

- 2.1.1. Find the missing values $a - d$ in the table. (2)
- 2.1.2. Give the formula to find any term in the sequence. (2)
- 2.1.3. Find the value of the 100th term. (1)
- 2.2. A piece of string is put into a machine, which cuts it in half and then adds a 1.5cm loop to each end of the string.
- 2.2.1. Draw a flow diagram to show what happens to a piece of string. (3)
- 2.2.2. If the original piece of string is 18cm, how long will the pieces of string be that come out of the machine? (2)
- 2.2.3. If a piece of string that comes out of the machine is 7cm, how long was the original piece of string that went into the machine? (3)
- 2.2.4. Create a table with the following input values: 12cm, 20cm, 50cm and 84cm. (2)
- 2.3. Given the graph: $y = -3x + 9$
- 2.3.1. Determine the gradient, and x- and y-intercepts. (3)
- 2.3.2. Draw the graph. (3)
- 2.3.3. Is the graph increasing, decreasing or constant? (1)

2.4. Determine the equations of the graphs given on the Cartesian plane below: (4)



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Question 3

3.1. Given the following expression: $7a^4b^3 + 6a^2b - 9ab^3 - 11a + 12$

3.1.1. Name the variables in the expression. (1)

3.1.2. Give the coefficient of a . (2)

3.1.3. What is the constant in the expression? (1)

3.1.4. If $a = -2$ and $b = 3$, determine the value of the expression. (3)

3.2. Simplify the following:

3.2.1. $(9x + 4)(8x - 7) + \frac{x^2 + 10x + 21}{x + 3}$ (4)

3.2.2. $(x - 6)^2 + (x - 6)(x + 6)$ (3)

3.3. Solve for x:

3.3.1. $\frac{x+3}{4} + \frac{x-6}{5} = 12$ (4)

3.3.2. $x^2 + 10 = -7x$ (2)

3.3.3. $(x + 3)(x - 8) = -4x\left(4 + \frac{13}{x}\right)$ (3)

3.4. If the length of a rectangle is $x + 3\text{cm}$ and the breadth is $x + 7\text{cm}$, and the area of the rectangle is 5cm^2 , determine the possible lengths and breadths of the rectangle. (4)

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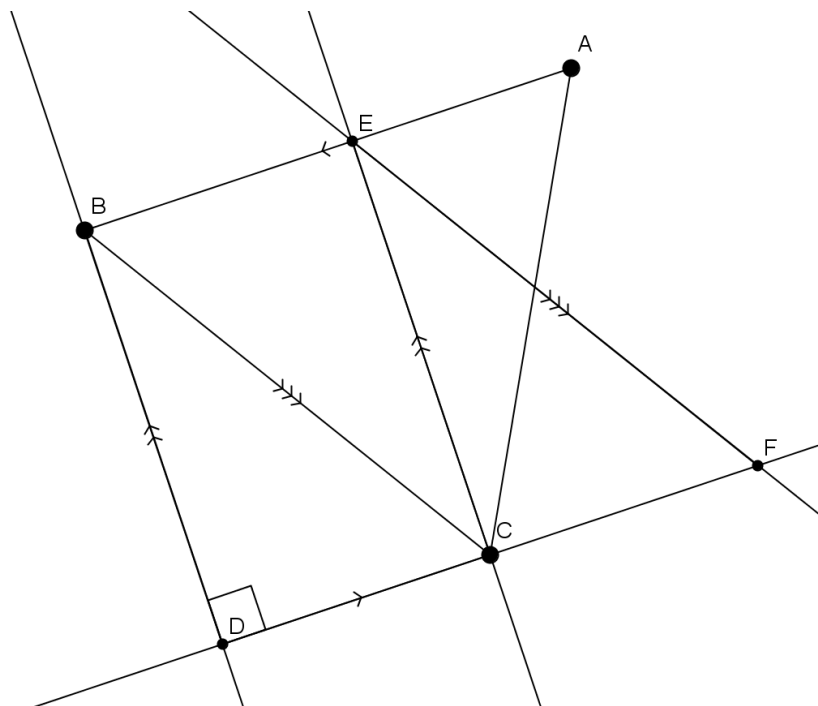
Section 2 - Geometry

Question 4

4.1. Construct an isosceles triangle with a base of 5cm and base angles of 30° . (5)

4.2. Draw an equilateral triangle with sides 3.5cm . (3)

4.3. Given the diagram below with $AB \parallel DF$, $BD \parallel EC$ and $BC \parallel EF$. BD is perpendicular to DF .

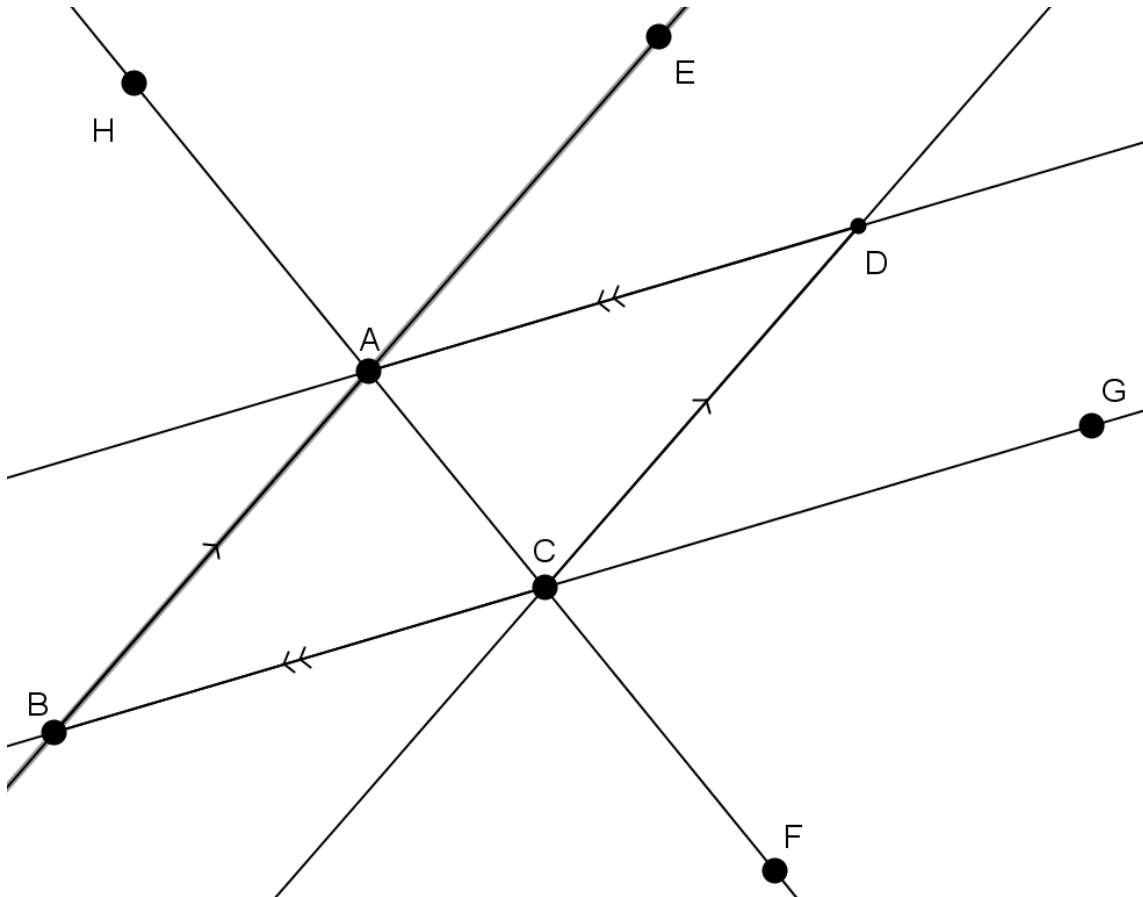


4.3.1. Given that $BE = DC$, prove that $\triangle BEC$ is congruent to $\triangle BDC$. (4)

4.3.2. Hence, what kind of shape is quadrilateral $BDCE$? Give a reason for your answer. (2)

4.3.3. Give two other angles equal to $\hat{D}BC$, with reasons. (4)

4.4. Given the diagram below with $AD \parallel BG$ and $BE \parallel CD$. It is also given that $ABCD$ is a rhombus.



4.4.1. Prove that $\triangle ABC$ is similar to $\triangle ACD$. (2)

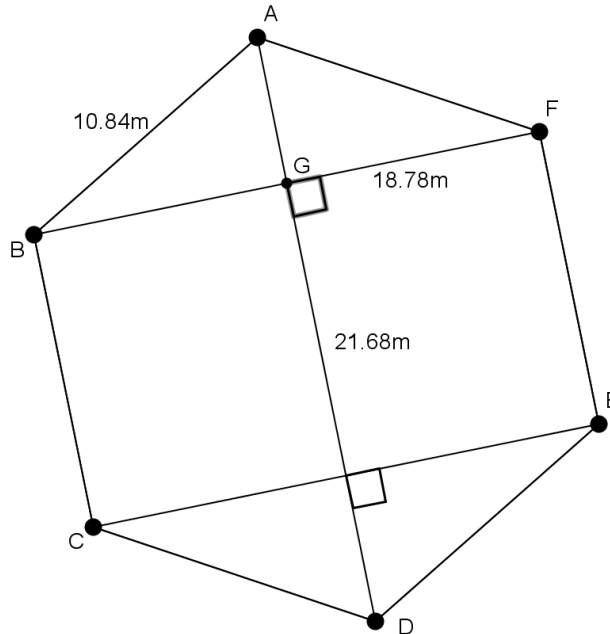
4.4.2. Given that $\hat{G}CD = 30^\circ$, find two other angles that are also equal to 30° . (2)

4.4.3. If AC is the diagonal of $ABCD$, determine the size of $\hat{A}CD$. (3)

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Question 5

- 5.1. Given below is a regular hexagon, with the distance $AB = 10.84\text{m}$, the distance $BF = 18.78\text{m}$ and the distance $AD = 21.68\text{m}$. AD is the perpendicular bisector of lines BF and CE .

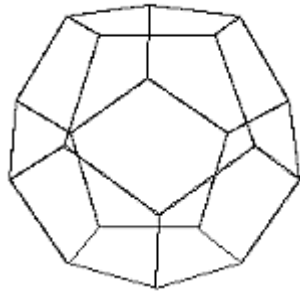


- 5.1.1. Find the length of AG . (4)
- 5.1.2. Find the perimeter of the hexagon. (2)
- 5.1.3. Find the area of the hexagon. (2)
- 5.1.4. If a circle with diameter 21.68m was placed behind the hexagon, what area of the circle would be visible around the hexagon? (2)
- 5.2. A toilet paper manufacturer would like to do a special Christmas box set of 12 toilet paper rolls, in a pretty rectangular box. The toilet paper has a height of 10cm , and a diameter of 8cm .
- 5.2.1. If the box fits exactly 4 rolls per row, and 3 rolls per column, draw a net to show the exact size the box would need to be, if it has a lid that closes exactly on the edge. (4)
- 5.2.2. Determine the surface area of the box that would need to be printed on. (3)
- 5.2.3. Determine the volume of empty space that will be inside the box. Assume that the toilet rolls centers are filled with pretty silver tissue paper. (4)

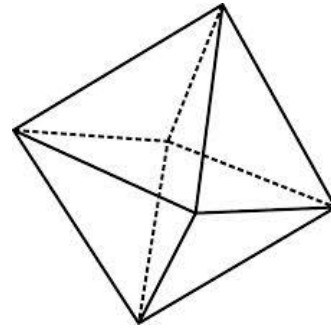
5.3. Give the names of the following shapes:

(3)

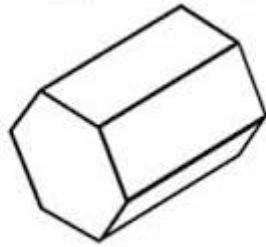
5.3.1.



5.3.2.



5.3.3.



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Question 6

6.1. Redraw the following table and fill in the letters a - e.

(5)

| Original Point | Image | Rule |
|----------------|------------|------------------------------------------|
| $(-8; 1)$ | $(1; -8)$ | a. |
| b. | $(-1, -3)$ | Translate 3 units right and 2 units down |
| $(3; 2)$ | c. | Enlarge by a factor of 4 |
| $(5; -5)$ | $(5; 5)$ | d. |
| e. | $(-2; 4)$ | Reflect about the y-axis |

6.2. If ΔABC is reduced by a factor of 3, to $\Delta A'B'C'$, what will happen to the:

6.2.1. perimeter?

(1)

6.2.2. area?

(2)

[8]

Question 7

One day Ziyaad was bored so he decided to write down the different colours of cars as they drove past his house. Here are his results for Monday:

R B S B G G W W G Y W B W Y
S Y G R S B G Y G W B W Y S

7.1. Draw a tally table to represent the above data. (2)

7.2. What is the modal colour of cars? (2)

7.3. Draw a pie chart to represent this data. (4)

7.4. Ziyaad decides to do this every day for the rest of the week. Here are the number of cars he saw each day:

Tuesday = 79 Wednesday = 35 Thursday = 16 Friday = 34.

7.4.1. What is the average number of cars that drive past Ziyaad's house? (2)

7.4.2. What is the range of the information given above? (1)

7.4.3. On one of the days Ziyaad counts cars between 7 and 8 o'clock in the morning. Which day do you think this is? Give a reason for your answer. (2)

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Question 8

Thando has a work uniform that consists of three shirts which she is equally likely to wear and either pants or a skirt. The probability of Henrietta choosing to wear the skirt is 0.3.

8.1. Draw a tree diagram to represent this information. (2)

8.2. What is the chance that Henrietta will choose to wear pants and the first shirt? (2)

[4]

Total [150]