

# SHARP

June Exam 2014

Grade 9 Mathematics

**Marks: 150**

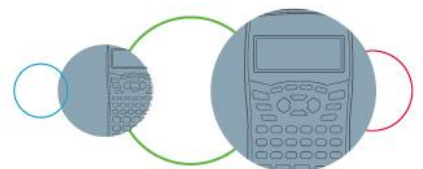
**Time: 2 hours**

**Instructions:**

Read the following instructions carefully before answering the questions:

1. This question paper consists of 7 pages.
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**



## Question 1

1.1. For each number in the table tick the correct columns:

| Number          | Real | Non-Real | Rational | Irrational | Integer | Whole | Natural |
|-----------------|------|----------|----------|------------|---------|-------|---------|
| 0               |      |          |          |            |         |       |         |
| $\sqrt{-3}$     |      |          |          |            |         |       |         |
| $\sqrt[3]{-64}$ |      |          |          |            |         |       |         |
| 13              |      |          |          |            |         |       |         |
| $\sqrt{7}$      |      |          |          |            |         |       |         |

(5)

1.2. For each of these pairs of numbers use prime factorising to find the lowest common multiple and highest common factor:

1.2.1. 220 and 495 (2)

1.2.2. 450 and 465 (2)

1.3. Find the answers to the following sums without using your calculator (in other words, show all your working out):

1.3.1.  $(-3)^2 + 9$  (2)      1.3.2.  $-4(-5) + (-10) + 0$  (2)

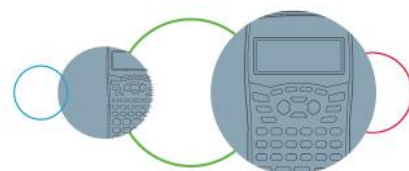
1.3.3.  $\sqrt[3]{-27} - (-3)$  (2)      1.3.4.  $\frac{42}{-7} + 5(-2) - 3$  (2)

1.3.5.  $\sqrt{0.36}$  (2)      1.3.6.  $\frac{1}{4} + \left(\frac{3}{2}\right)^2 - \sqrt{\frac{9}{16}}$  (3)

1.4 Find the missing values in the table and write down the letter and the answer on your answer sheet.

| Fraction      | Decimal | Percentage |
|---------------|---------|------------|
| $\frac{3}{5}$ | a)      | b)         |
| c)            | 0.15    | d)         |
| e)            | f)      | 102%       |
| g)            | 0.76    | h)         |
| $\frac{1}{3}$ | i)      | j)         |

(5)



- 1.5. Desiree has R260. She spends  $\frac{1}{4}$  of it on food. She spends R120 on a pair of shoes and decides to save the rest.

1.5.1. Complete:  $\frac{1}{4} = \frac{?}{260}$  (1)

1.5.2. What fraction of money does Desiree save? (2)

1.5.3. What percentage of her money does Desiree spend on shoes? (2)

1.5.4. If Desiree's money is increased by 15%, how much money does she now have? (3)

[35]

## Question 2

- 2.1. Simplify the following:

2.1.1.  $\frac{x^2y^3}{(x^0z)^3} \div \frac{x^{-4}y^6}{x^3y^{-7}}$  (2)

2.1.2.  $\left(\frac{x}{y} + \frac{y}{x}\right)^{-1}$  (2)

- 2.2. Write the following in scientific notation:

2.2.1. 3 212 (1)

2.2.2. 785 148 000 (1)

- 2.3. Write the following in normal notation:

2.3.1.  $8.13 \times 10^{-9}$  (1)

2.3.2.  $3.675 \times 10^{-2}$  (1)

- 2.4. Write down the answer to the following calculation (show all your working out): (2)

$$4.87 \times 10^5 + 6 \times 10^4$$

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## Question 3

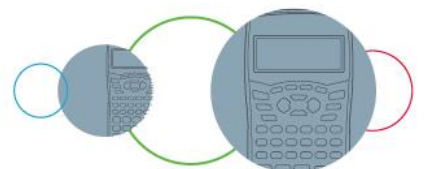
- 3.1. Ella and her friend, Greg, have a bet. If Ella loses she must pay Greg 25c the first week, 50c the second week, R1 the following week and so on. If Greg loses he must pay Ella, 50c the first week, R1 the second week, R1.50 the following week and so on.

3.1.1. Write down the next three amounts Ella and Greg would each need to pay. (2)

3.1.2. Write down a rule for Ella's payments. (2)

3.1.3. Write down a rule for Greg's payments. (2)

3.1.4. How long will it take for Ella to pay more than R16? (3)



3.2. Andy volunteers at a dog shelter. He spends  $4\frac{1}{4}$  hours there every week.

3.2.1. Redraw the table on your answer paper and fill in the missing values:

| Week        | 1              | 2              | 3               | 4 | 8 | 11 | ?  | ?                |
|-------------|----------------|----------------|-----------------|---|---|----|----|------------------|
| Total Hours | $4\frac{1}{4}$ | $8\frac{1}{2}$ | $12\frac{3}{4}$ | ? | ? | ?  | 85 | $106\frac{1}{4}$ |

(5)

3.2.2. Use the table to draw a graph to represent the relationship between the number of hours Andy spends at the dog shelter and the number of weeks. What kind of relationship does this graph show us?

(3)

[17]

#### Question 4

4.1. Simplify the following:

4.1.1.  $(4x - y)(4x + 3y)$  (2)

4.1.2.  $\frac{3x-6}{2x} \times \frac{3x^2}{5x-10}$  (3)

4.1.3.  $\frac{3x+5}{9x^2-25} \div \frac{3x}{9x^2-15x}$  (3)

4.2. Solve for  $x$  in the following:

4.2.1.  $x^2 + 10x + 24 = 0$  (2)

4.2.2.  $3(x - 7) = 5x + 11$  (2)

4.2.3.  $x^2 + 7x + 6 = 0$  (2)

4.2.4.  $\frac{3x}{5} + 4 = 19$  (3)

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#### Question 5

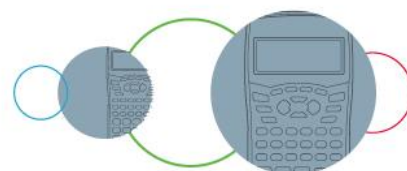
5.1. Construct a right-angled triangle with a base that is 5cm in length, and the second angle on the base is  $30^\circ$ . (7)

5.2. Construct an isosceles triangle with base angles  $30^\circ$  and base sides equal to 3cm. (6)

[13]

#### Question 6

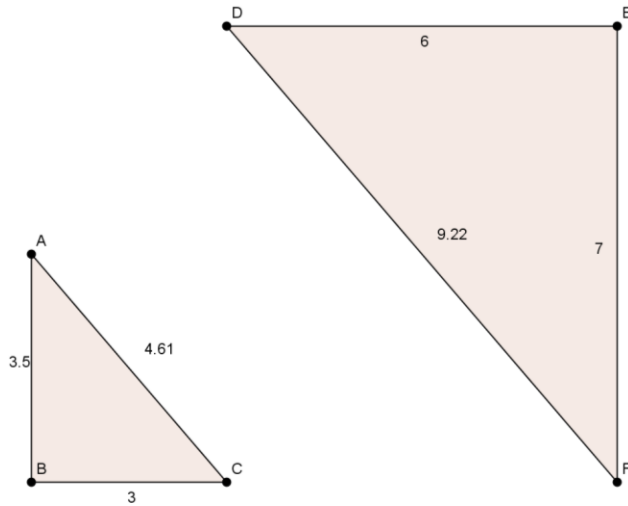
6.1. Give all the properties of a rhombus. (4)



6.2. Prove the following triangles similar:

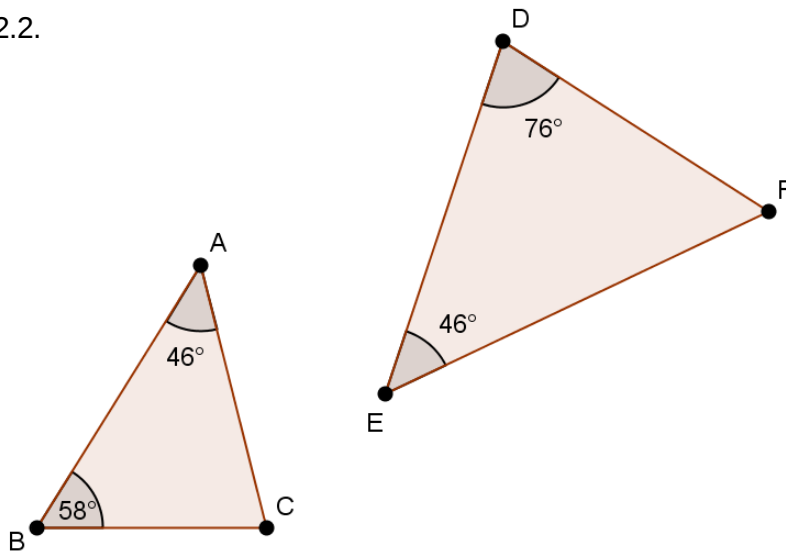
6.2.1.

(4)



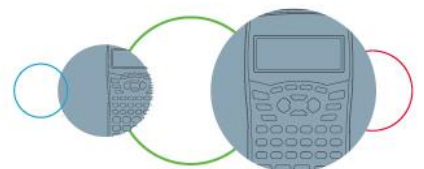
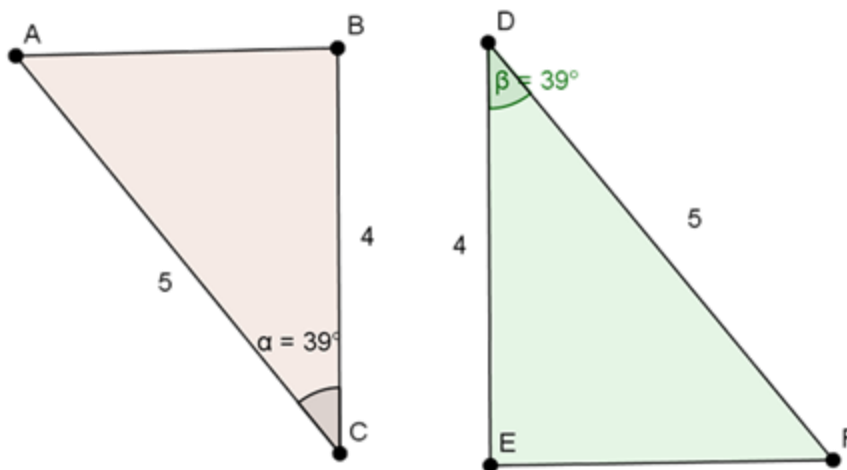
6.2.2.

(4)



6.3. Prove that the following triangles are congruent:

(4)



6.4. Say whether the following are true or false:

6.4.1. When all three angles in a triangle are equal the triangle is an isosceles triangle. (1)

6.4.2. The angles in a square add up to  $380^\circ$ . (1)

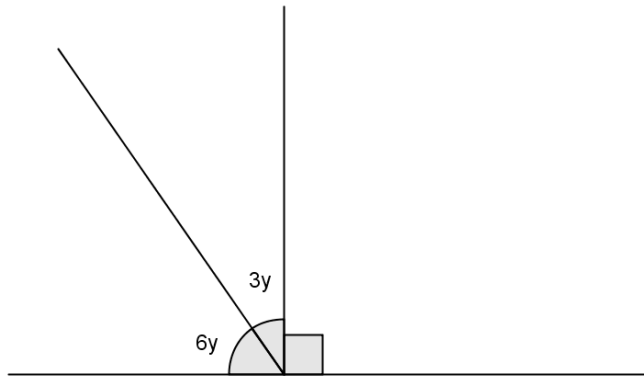
6.4.3. A square is also a rectangle. (1)

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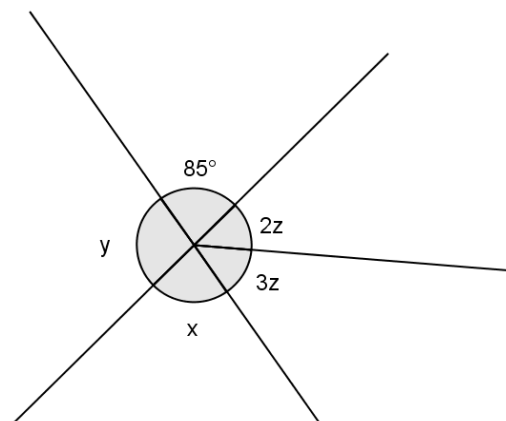
### Question 7

Find the values of the variables in these diagrams with reasons:

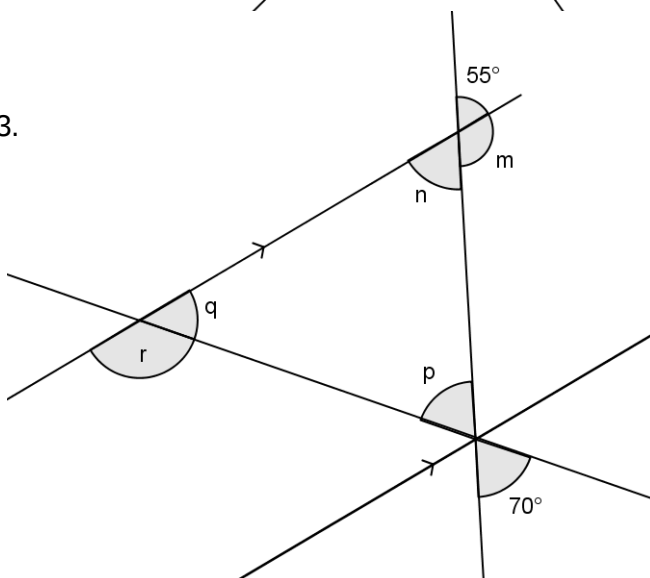
7.1. (3)



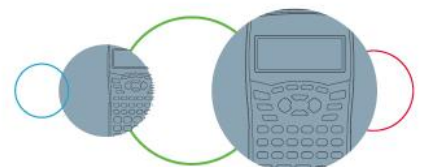
7.2. (7)



7.3. (8)

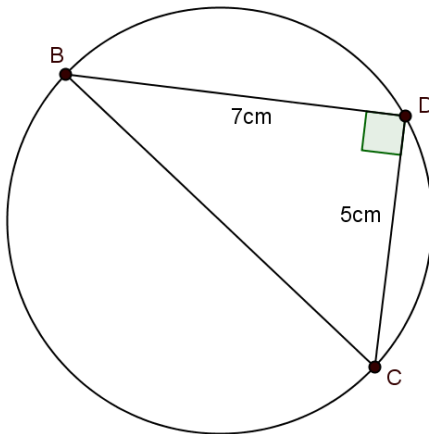


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## Question 8

8.1. Given the circle below with right-angled triangle BCD. BD is 7cm and DC is 5cm.



8.1.1. Find the diameter of the circle. (2)

8.1.2. Find the area of triangle BCD. (2)

8.1.3. Find the area in the circle that is not covered by  $\triangle BCD$ . (3)

8.1.4. Find the circumference of the circle. (2)

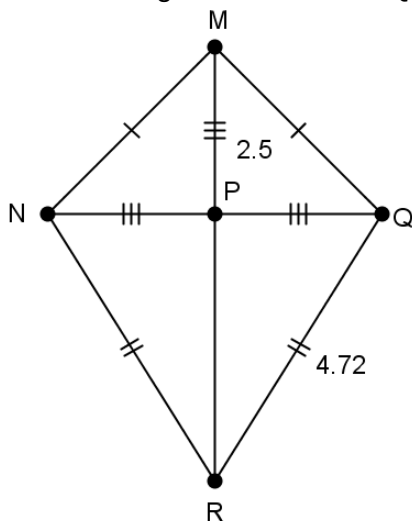
8.2. A square has a perimeter of 48mm.

8.2.1. Find the length of the sides of the square. (1)

8.2.2. Find the area of the square. (2)

8.2.3. What is the length of the diagonal of the square? (3)

8.3. In the diagram below, MNRQ is a kite.



8.3.1. Find the length of MQ and MN. (2)

8.3.2. Find the length of PR. (2)

8.3.3. Hence, or otherwise, find the area of the kite. (2)

[21]

**Grand Total: [150]**

