UNIT 7 *Number System and Bases* CSEC Revision Test

1. $T = \sqrt[4]{\frac{7}{9}}$

(a) (i) Write down the value of T^4 as a rational number.

(ii) What are the next two positive powers of T that give a rational number?

(iii) Write down a rule to find out whether T^n is rational or irrational when n is an integer. *(5 marks)*

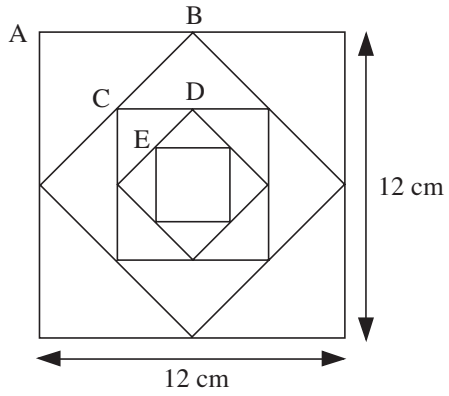
(b) Write these recurring decimals as fractions.

(i) $0.077\ 777\ 777\ \ldots$ (ii) $0.070\ 707\ 070\ 7\ \ldots$ *(4 marks)*

2. (a) Write down the irrational numbers from the following list.

$$144^{\frac{1}{2}},\quad 72^{\frac{1}{2}},\quad 36^{\frac{1}{2}},\quad 18^{\frac{1}{2}},\quad 9^{\frac{1}{2}}$$ *(2 marks)*

(b) The midpoints of the sides of a square of side 12 cm are joined to form another square. The process is repeated so that a nest of five squares is formed.



Each square is labelled at one vertex only.

The area of square B is half the area of square A.

The area of square C is half the area of square B and so on.

(i) Calculate the perimeter of square C.

(ii) Is the perimeter of square D rational or irrational? Explain your answer.

(4 marks)

3. The number, c, is equal to $\sqrt{a^2 + b^2}$.

In each case, state whether c is rational or irrational, giving its value in its simplest form.

(a) $a = 3,\ b = 4$ (b) $a = \sqrt{2},\ b = \sqrt{7}$

(c) $a = \sqrt{2},\ b = \sqrt{6}$ (d) $a = -\sqrt{5},\ b = 2$

(8 marks)

© CIMT and e-Learning Jamaica

UNIT 7 *Number System and Bases* CSEC Revision Test

4. In the following list, which are irrational numbers?

$$0.45,\ \frac{1}{4},\ \sqrt{13},\ \sqrt{16},\ \pi,\ 0.\dot{6},\ \sqrt[3]{27},\ \sqrt[3]{36}$$ *(3 marks)*

5. (a) Write down a rational number beween 1.2 and 1.25.

(b) Write down an irrational number between 1.2 and 1.25. *(2 marks)*

6. Convert each of the following binary numbers to base 10:

(a) 110011 (b) 110110 (c)1011011 *(6 marks)*

7. Convert each of the following numbers from base 10 to binary:

(a) 28 (b) 47 (c) 162 *(6 marks)*

8. In binary, calculate:

(a) $111 + 111$ (b) 1101×11

(c) $1100 - 101$ (d) 110×111 *(8 marks)*

9. Convert the base 5 number 124 to base 10. *(2 marks)*

10. Convert the base 10 number 242 to base 8. *(2 marks)*

11. Calculate 2×8 in base 9. *(2 marks)*

12. Calculate $142 + 243$ in base 6. *(2 marks)*

13. Convert the base 9 number 147 to base 10. *(2 marks)*

(TOTAL: 58 MARKS)

© CIMT and e-Learning Jamaica

UNIT 7 *Number System and Bases* CSEC Revision Test

ANSWERS

1. (a) (i) $\frac{7}{9}$ (ii) T^8, T^{12} B1 B1 B1

   (iii) T^n is rational if $n = 4m$, m integer B2

   (b) (i) $\frac{7}{90}$ (ii) $\frac{7}{99}$ M1 A1 M1 A1 *(9 marks)*

2. (a) $72^{\frac{1}{2}}$, $18^{\frac{1}{2}}$ (b) (i) 24 cm (ii) $12\sqrt{2}$, irrational B1 B1 B1 M1 A1 B1 *(6 marks)*

3. (a) 5, rational (b) 3, rational B2 B2

   (c) $2\sqrt{2}$, irrational (d) 3, rational B2 B2 *(8 marks)*

4. $\sqrt{13}$, π, $\sqrt[3]{36}$ B1 B1 B1 *(3 marks)*

5. (a) $1.24 = \frac{124}{100}$ etc. (b) $\sqrt{1.45}$ etc. B1 B1 *(2 marks)*

6. (a) $1 + 2 + 16 + 32 = 51$ M1 A1

   (b) $2 + 4 + 16 + 32 = 54$ M1 A1

   (c) $1 + 2 + 8 + 16 + 64 = 91$ M1 A1 *(6 marks)*

7. (a) 11100 B2

   (b) 101111 B2

   (c) 10100010 B2 *(6 marks)*

8. (a) 1110 B2

   (b) 100111 B2

   (c) 111 B2

   (d) 101010 B2 *(8 marks)*

9. $25 + 10 + 4 = 39$ M1 A1 *(2 marks)*

10. $3 \times 64 + 6 \times 8 + 2 = 362$ M1 A1 *(2 marks)*

11. 17 B2 *(2 marks)*

12. 425 B2 *(2 marks)*

13. $81 + 4 \times 9 + 7 = 124$ M1 A1 *(2 marks)*

(TOTAL MARKS: 58)

© CIMT and e-Learning Jamaica