



ALGEBRA, EQUATIONS & INEQUALITIES

MATHEMATICS GRADE 10

REVISION PACK

PAST PAPERS

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QUESTION 1 (NOV 06)

Simplify:

1.1.1 $(3x - 2)(x^2 + 1) - 2$ (3)

1.1.2 $\frac{(2^2 \times 3)^{x+1}}{2^{2x} \times 3^x}$ (4)

1.1.3 $\frac{x^2-1}{3} \times \frac{1}{x-1} - \frac{1}{2}$ (4)

1.2 What must be added to $x^2 - x + 4$ to make it equal to $(x + 2)^2$? (3)

1.3 It is given that $2\,000 = 2 \times M^3 \times N^3$, where M and N are whole numbers. Determine the value of $M \times N$. (3)

1.4 Factorise:

1.4.1 $3x^2 - 5x - 2$ (2)

1.4.2 $n^2 + 3n - 15$ (3)

1.5 Write down at least THREE rational numbers between $\sqrt{2}$ and $\sqrt{10}$ (3)
[25]

QUESTION 2 (NOV 06)

2.1 Solve for x in the following equations:

2.1.1 $2x(x - 1) = 4$ (4)

2.1.2 $3^x = 75$ (Answer rounded off correctly to ONE decimal place.) (3)

2.2 Solve the following inequality.

Illustrate your answer on a number line if x is a real number.

$-2 \leq x - 1 < 3$ (4)

[11]

QUESTION 1 (EXEMPLAR 12)

Simplify the following expressions fully:

1.1.1 $(m - 2n)(m^2 - 6mn - n^2)$ (3)

1.1.2 $\frac{x^3+1}{x^2-x+1} - \frac{4x^2-3x-1}{4x+1}$ (5)

1.2 Factorise the following expressions fully:

1.2.1 $6x^2 - 7x - 20$ (2)

1.2.2 $a^2 + a - 2ab - 2b$ (3)

1.3 Determine, **without the use of a calculator**, between which two consecutive integers $\sqrt{51}$ lies. (2)

1.4 Prove that $0, \dot{2}\dot{4}\dot{5}$ is rational. (4)
[19]

QUESTION 2 (EXEMPLAR 12)

2.1 Determine, **without the use a calculator**, the value of x in each of the following:

2.1.1 $x^2 - 4x = 21$ (3)

2.1.2 $96 = 3x^{\frac{5}{4}}$ (3)

2.1.3 $R = \frac{2\sqrt{x}}{3s}$ (2)

2.2 Solve for p and q simultaneously if:

$6q + 7p = 3$

$2q + p = 5$ (5)

[13]

QUESTION 1 (NOV 12 HUD)

- 1.1 Given: $K = (2x + 1)^2 - (2x - 1)^2$
- 1.1.1 Multiply K out and then simplify as far as possible. (3)
- 1.1.2 Factorise K fully and then simplify as far as possible. (2)
- 1.1.3 Hence, without the use of a calculator, evaluate:
 $(100\ 001)^2 - (99\ 999)^2$ (2)
- 1.3 If: $x + \frac{1}{x} = 9$, evaluate: $x^2 + \frac{1}{x^2}$ (2)
- [9]

QUESTION 2 (NOV 12 HUD)

- 2.1. Factorise fully:
- 2.1.1 $x(x - 1) - y(y - 1)$ (4)
- 2.1.2 $16x^2 - 12x - 18$ (2)
- 2.1.3 $x^2 - \frac{1}{6}x - 2$ (2)
- 2.2. Write as a single term, fully factorised:
 $\frac{3}{x+2} - x$ (4)
- 2.3 simplify fully:
 $\frac{\frac{1}{x^3} - \frac{1}{y^3}}{\frac{y-x}{x-y}}$ (5)
- 2.4 Write as a single term, simplify fully:
 $\frac{5}{x^2-4} + \frac{x+1}{3(2-x)} - \frac{1}{-12-6x}$ (7)
- [24]

QUESTION 3 (NOV 12 HUD)

- 3.1 Solve for x :
- 3.1.1. $2x^3 - 3x^2 + 8x - 12 = 0$ (4)
- 3.1.2 $\frac{2x-3}{x+2} = \frac{2x-3}{x+2}$ (2)
- 3.1.3 $0 = -\frac{x-5}{3} + 4$ (2)
- 3.1.4 $\frac{3x-1}{x+\frac{1}{2}} = \frac{x-5}{3x-1}$ (6)
- 3.1.5 $5x^{\frac{2}{3}} - 4 = 0$ (4)
- 3.1.6 $8\pi x - 680x^{-2} = 0$ (3)
- 3.1.7 $4a^2x - 2a = b^2x - b$ (4)
- 3.2 Given: $-3 < 4 - 2x \leq 5$
- 3.2.1 Solve for x . (2)
- 3.2.2. State your answer to (3.2.1.):
- 3.2.2.1. on a number line. (1)
- 3.2.2.2. in interval notation. (1)
- 3.3 Solve for x and y :
 $4y + 3x = 18$
 $2x + y = 2$ (4)
- [33]

QUESTION 4 (NOV 12 HUD)

CALCULATORS MAY NOT BE USED IN THIS QUESTION.

- 4.1 Multiply out and simplify as far as possible:
 $3x^{\frac{1}{2}} \left(x^{\frac{1}{2}} - 2x^{-\frac{1}{2}} \right)$ (2)
- 4.2 Simplify fully:
 $\frac{(2.3^{x+1})^3}{\sqrt{3^{16x} \cdot 12^{3-2x}}}$ (4)

- 4.3 If: $2^x = a$, determine the following in terms of a :
 4.3.1. 8^x (1)
 4.3.2. 2^{x+3} (1)
 4.3.3. $5 \cdot 2^{-x}$ (1)
 4.4 factorise fully: $-7x^{-\frac{3}{8}} + 2x^{-\frac{3}{4}} - 4$ (2)
 4.5 Solve for x : $4 \cdot 3^{2x-1} - \frac{1}{3} \cdot 3^{2x+2} = -1\frac{2}{3}$ (4)
 [15]

QUESTION 1(NOV 13 HUD)

- 1.1 If a and b are integers and c is irrational, which of the following are rational numbers.
 a) $\frac{-b}{a}$
 b) $c \div c$
 c) $\frac{a}{c}$
 d) $\frac{1}{c}$ (2)
 1.2 Rewrite $1,2\bar{8}$ as improper fraction. (3)

[5]

QUESTION 2 (NOV 13 HUD) (10marks)

- 2.1 Multiply the following by removing the brackets and then simplify if possible.
 2.1.1 $y(x + 3) - 6y$ (2)
 2.1.2. $(x^3 - y^3)(x^6 + y^6)(x^3 + y^3)$ (2)
 2.1.3. $3(x - 1)(x + 1) - 4(2x - 3)^2$ (4)
 2.2 If $(a + b)^2 = 12$ and $ab = 2$, calculate the value of: $a^2 + b^2$ (2)

QUESTION 3 (NOV 13 HUD)

- Factorise fully:
 3.1 $x(3x - 2) - y(3y - 2)$ (5)
 3.2 $\frac{1}{1000}x^3 + \frac{27}{64}$ (3)
 3.3 $10x^2 - 19x + 6$ (2)
 [10]

QUESTION 4(NOV 13 HUD)

Determine without the use of a calculator: $\frac{1999}{1998^2-1}$ [2]

QUESTION 5 (NOV 13 HUD)

Simplify the following fractions by making them one term, where necessary.

- 5.1 $\frac{2x^2+x-6}{2x^2+4x}$ (3)
 5.2 $\frac{x+\frac{1}{y}}{\frac{x}{y}-y} \div \frac{x+y}{x-y}$ (4)
 5.3 $\frac{2}{y^2-1} + \frac{3}{2-y-y^2} - \frac{1}{y^2+3y+2}$ (6)
 [13]

QUESTION 6 (NOV 13 HUD)

- 6.1 Solve for x .
 6.1.1 $\frac{5+x}{x} = -4$ (1)
 6.1.2 $x^2 - 3x = 0$ (2)
 6.1.3 $4x^2 + 9 = 15x$ (3)

6.1.4 $2x^3 - 3x^2 + 8x - 12 = 0$ (4)

6.1.5 $\frac{6x-9}{x-3} = \frac{3(2x-3)}{x-3}$ (2)

6.1.6 $3x^{\frac{4}{5}} - 2 = 0$ (4)

6.1.7 $h = \sqrt{\frac{x-1}{x+2}}$ (4)

6.2 Given: $-2 \leq \frac{x}{2} + 3 < 8$

6.2.1 Solve for x (2)

6.2.2 State your answer for 6.2.1 on a number line. (1)

6.2.3 State your answer for 6.2.1 in interval notation. (1)

6.3 Solve for x and y :

$$x - y = 1$$

$$3y + 4x = 25$$

6.4 Solve for y :

$$2^{2y} - 17 \cdot 2^y + 72 = 0$$

(5)

[33]

QUESTION 7 (NOV 13 HUD) (8marks)

7.1 Simplify the following fully:

7.1.1 $(a^y + b^y)^2$ (2)

7.1.2 $3y^{\frac{1}{5}}(2y^{\frac{1}{5}} - 5y^{\frac{-1}{3}})$ (2)

7.2 If $3^x = k$, rewrite the following in terms of k

7.2.1 81^x (2)

7.2.2 3^{x-1} (2)

QUESTION 1 (NOV 15)

1.1 factorise the following expressions fully:

1.1.1 $x^4 - 81$ (2)

1.1.2 $6x^2y - 10xy + 15x - 25$ (3)

1.2 Simplify the **following** expressions fully:

1.2.1 $\frac{3}{a-4} + \frac{2}{a+3} - \frac{21}{a^2-a-12}$ (5)

1.2.1 $\frac{10^{2x+3} \cdot 4^{1-x}}{25^{2+x}}$ (4)

1.3 Consider the following numbers: $\sqrt{27}$; $\sqrt[3]{27}$; $\sqrt{-27}$.

Which ONE of these numbers is:

1.3.1 Irrational (1)

1.3.2 Non-real (1)

[16]

QUESTION 2 (NOV 15)

2.1 Solve for x :

2.1.1 $15x^2 - 8 = 14x$ (4)

2.1.2 $5^x = \frac{1}{125}$ (2)

2.2 The following inequality is given: $3(x + 7) < \frac{x}{2} + 1$

2.2.1 Solve for x in the inequality. (3)

2.2.2 Represent your answer to QUESTION 2.2.1 on a number line. (1)

2.3 Mary gave one third of her money to Nazeem and fifth of her money to Elwethu. Elwethu received R28 less than Nazeem. How much money did Mary have originally? (1)

[14]

QUESTION 1 (NOV 17)

1.1 Given: $q = \sqrt{b^2 - 4ac}$

1.1.1 Determine the value of q if $a = 2$, $b = -1$ and $c = -4$. (2)

Leave your answer in simplest surd form

1.1.2 State whether q is rational or irrational. (1)

- 1.1.3 Between which TWO consecutive integers does q lie? (1)
- 1.2 Factorise the following expressions fully:
- 1.2.1 $t^2(r - s) - r + s$ (3)
- 1.2.2 $\frac{x^3+1}{x^2-x+1}$ (2)
- 1.3 Simplify the following completely:
- 1.3.1 $(2y + 3)(7y^2 - 6y - 8)$ (2)
- 1.3.2 $\frac{3}{x^2-9} + \frac{2}{(x-2)^2}$ (3)
- 1.3.3 $\frac{3^t-3^{t-2}}{2.3^t-3^t}$ (3)
- [17]

QUESTION 2(NOV 17)

- 2.1 Given $4 - 2x < 16$ where $x \in \mathbb{R}$
- 2.1.1 Solve the inequality. (2)
- 2.1.2 Hence, represent your answer to QUESTION 2.1.1 on a number line (1)
- 2.2 Solve simultaneously for x and y :
 $-2x - y = 10$ and $3x - 4y = -4$ (4)
- 2.3 Solve for x :
- 2.3.1 $\frac{x(x-5)}{6} - 1 = 0$ (3)
- 2.3.2 $c = \sqrt{a + 2x}$ (2)
- 2.4 Tabelo is currently four times as old as his daughter, Linda. Six years from now, Tabelo will be three times as old as Linda.
 Calculate Linda's age currently. (4)
- [16]

QUESTION 1 (MAY 07 WB)

Find the following products:

- 1.1 $-2x^2\left(x - \frac{3}{x}\right)$ (2)
- 1.2 $(x + 3)(x^2 - 3x + 9)$ (2)
- 1.3 $5(x - 2)^2 - 2(x - 7)(2x - 3)$ (4)
- [8]

QUESTION 2 (MAY 07 WB)

Factorise each of the following:

- 2.1 $12x^2 - 8x - 15$ (2)
- 2.2 $4x^2 - 32$ (3)
- 2.3 $x^3 - 3x^2 - 4x + 12$ (4)
- 2.4 $2x + 6 + y^2 - 7y - 2xy$ (4)
- 2.5 $(a^2 + 2ab + b^2) - 9b^2$ (3)

[16]

QUESTION 3 (MAY 07 WB)

Simplify the following:

3.1 $\frac{2p-2q}{q-p}$ (2)

3.2 $\frac{3}{x-1} + \frac{5}{2-x} + \frac{2x-3}{x^2-3x+2}$ (5)

3.3 $\frac{x^2-4x+3}{x^2-2x-3} \div \frac{3x^3-3}{2x^3+2x^2+2x} \div 2$ (6)

3.4 $\frac{\frac{b}{a}}{\frac{1}{a} - \frac{1}{b}}$ (5)

[18]

QUESTION 4 (MAY 07 WB)

Find the value of m if $m^2 = (a^2 - 16)(a^2 - 7a + 12)(a^2 + a - 12)$ [5]

QUESTION 5 (MAY 07 WB)

Solve for x in each of the following:

5.1 $\frac{4x+3}{3} - \frac{3x-11}{4} = 2$ (4)

5.2 $\frac{10}{x^2-9} + \frac{2}{9-x^2} + \frac{4}{x^2-3x} = \frac{-6}{x(x+3)}$ (6)

5.3 $3 \geq 1 - 2x \geq -7$ (3)

5.4 $\frac{x^2}{4} = 2x - 4$ (4)

5.5 $2 \cdot 5^{x+1} = 1250$ (3)

[20]

QUESTION 6 (MAY07 WB)

Solve for x and y in the following simultaneous equation:

$2x + 3y - 4 = 0$

$5x + 4y = 3$ [6]

QUESTION 1 (MARCH 18)

1.1 Determine the product of the following expressions:

1.1.1 $(2r + p)(4r^2 - 2rp + p^2)$ (2)

1.1.2 $\left(a + \frac{\sqrt{5}}{a^x}\right)\left(a - \frac{\sqrt{5}}{a^x}\right)$ (2)

1.2 Simplify the following expressions fully:

1.2.1 $\frac{ax^2-a^2x}{x^2-a^2} \times \frac{x^2+ax-bx-ab}{ax}$ (4)

1.2.2 $\frac{1}{m^3} - \frac{1}{mn^2}$ (3)

[11]

QUESTION 2 (MARCH 18)

2.1 Without using a calculator, simplify the following expression fully:

$$\frac{18^n \times 8^{n-1}}{9^{n+2} 2^{n-3}} \quad (3)$$

2.2 Solve for x in the following equations:

2.2.1 $x^{\frac{3}{2}} = 512$ (2)

2.2.2 $3^{2002} - 3^{2000} = 8 \cdot 3^x$ (3)

2.3 Given: $4^{x+y} = 64$ and $3^{x-y-1} = 1$

2.3.1 Show that if $4^{x+y} = 64$ and $x + y = 3$ (2)

2.3.1 Show that if $3^{x-y-1} = 64$ and $x - y = 1$ (1)

2.3.3 Hence or otherwise, find the value of $3^x \cdot 5^y$ (4)

[15]

QUESTION 3 (MARCH 18)

3.1 Solve for x :

3.1.1 $8x^2 + 14x - 15 = 0$ (2)

3.1.2 $t = 2\pi \sqrt{\frac{x}{g}}$ (2)

3.1.3 $(x - 1)(y + 3) = 0$
3.1.3.1 if $y = -3$ (1)

3.1.3.2 if $y = 4$ (1)

3.2 Solve for t : $-8 \leq -2t < 18$. Write your answer in interval notation. (2)

[8]

QUESTION 1 (JUNE 12 HUD)

1.1 Between which TWO consecutive natural numbers does $\sqrt[3]{25}$ lie? Show all relevant working out. **Calculators may not be used.** (2)

1.2 Multiply out and simplify as far as possible:

1.2.1 $8 - 2(4x - 3)x$ (1)

1.2.2 $\left(x + \frac{1}{x}\right)^2$ (2)

1.3 factorise fully:

1.3.1 $2x^3 + x - 6x - 3$ (3)

1.3.2 $27x^3 + 8$ (2)

1.3.3 $\frac{1}{2}x^2 - \frac{5}{2}x + 3$ (2)

1.4 Simplify, leaving your answer as single term:

1.4.1 $3x - \frac{x-2}{4}$ (2)

1.4.1 $\frac{5}{(x+1)(3x-2)} + \frac{2x+7}{4(2-3x)}$ (4)

[18]

QUESTION 2 (JUNE 12 HUD)

- 2.1 Solve for x :
- 2.1.1 $2x - 5\left(\frac{2}{3}x - 3\right) = 8$ (2)
- 2.1.2 $\frac{3x+1}{3x-2} = \frac{x-2}{x+2}$ (4)
- 2.1.3 $a(x + 1) = -c(x + 1)$ (4)
- 2.1.4 $3x^2 = x$ (3)
- 2.1.5 $-2x^2 - 5x + 12 = 0$ (3)
- 2.1.6 $x^{\frac{4}{5}} = 10$ (3)
- 2.1.7 $3x^{-2} - 4x = 0$ (3)

- 2.2 Given: $-8 \leq -3x + 2 < 2$
- 2.2.1 Solve the given inequality, for x . (2)
- 2.2.2 State the answer to (2.2.1.):
- 2.2.2.1. on a number line. (2)
- 2.2.2.1 in interval notation. (2)

- 2.3 solve for x and y :
- $$\begin{aligned} 2x - y &= 17 \\ 4y + 3x &= 9 \end{aligned}$$
- (4)

[32]

QUESTION 3 (JUNE 12 HUD)

CALCULATORS MAY NOT BE USED IN THIS QUESTION

- 3.1 Simplify fully:
- 3.1.1 $\frac{\left(\frac{1}{y^3}\right)^{n-1} \times \sqrt[3]{x^8}}{(xy^{-2n+3})^4}$ (4)
- 3.1.2 $\frac{\frac{y-x}{x} \cdot \frac{y}{y}}{\frac{y}{y} \cdot \frac{x}{x}}$ (3)
- 3.2 Factorise fully:
- $$7x^{\frac{2}{3}} + 6x^{\frac{4}{3}} - 3$$
- (2)
- 3.3 Solve for x :
- 3.1.2 $16^x = \sqrt{8}$ (3)
- 3.3.2 $3 \cdot 5^{2x-1} - 5^{2x} = -2$ (4)

[16]

QUESTION 1 (JUNE 15 HUD)

- 1.1 Write $1\frac{3}{4}$ as an improper fraction, showing all working out; Calculators may not be used. (3)

- 1.2 Show between which two consecutive whole numbers $\sqrt[3]{100}$ lies; **show all working out and do not use a calculator.** (2)
- 1.3 Given; $T = \frac{\sqrt{2-5x}}{1-x}$ write down a value of x which will result in T being:
- 1.3.1 Non-real (1)
- 1.3.2 Undefined (1)
- [7]

QUESTION 2 (JUNE 15 HUD)

2. Multiply out and simplify as far as possible:
- 2.1 $x^2 - (x - 1)x - 1$ (2)
- 2.2 $\left(3x - \frac{1}{3}\right)\left(9x^2 + x + \frac{1}{9}\right)$ (2)
- 2.3 $(2a + b)(2a - b) - (2a - b)^2$ (3)
- 2.4 $(2^x + 3)(2^x - 1)$ (3)
- [10]

QUESTION 3 (JUNE 15 HUD)

3. Simplify fully, leaving your answer as a single a single term:
- 3.1 $\frac{9y^2-6y}{6y}$ (2)
- 3.2 $\frac{x-y}{x} \div \frac{x^2-xy}{y-x} \times \frac{2x+y}{2x^2-xy-y^2}$ (6)
- 3.3 $\frac{\frac{2}{x+h} - \frac{2}{x}}{h}$ (4)

The area of a rectangle is given by $A = 2x^2 - 8$. The breadth of the rectangle is given by the expression $x - 2$. Calculate the length in terms of x , where $x > 2$. (3)

[15]

QUESTION 4 (JUNE 15 HUD)

Factorise fully:

- 4.1 $(2a - c)^2 - c^2$ (3)
- 4.2 $4x^2 + 31x - 8$ (2)
- 4.3 $(x - y)a^2 + 2(x - y)a - 3(x - y)$ (3)
- 4.4 $ax - bx - ay + by$ (3)
- 4.5 $\frac{x^2}{2} - \frac{5x}{2} + 3$ (3)
- 4.6 $3 \cdot 4^x + 2^{x+1} - 1$ (3)
- 4.7 $2x^{\frac{4}{3}} + 3x^{\frac{2}{3}} - 2$ (2)

[19]

QUESTION 5 (JUNE 15 HUD)

5.1 Simplify, leaving your answer with no negative exponents:

$$\frac{8^{x+2} \cdot 12^x \cdot 3}{3^{x-1} \cdot 16^{x+2}} \quad (4)$$

5.3 If $2^x = 3$, evaluate:

5.3.1 2^{x+1} (1)

5.3.2 $\left(\frac{1}{8}\right)^x$ (3)

QUESTION 6 (JUNE 15 HUD)

6. Solve for x .

6.1 $2x + 3 = 2x + 3$ (1)

6.2 $-6x^2 + 15x = -36$ (3)

6.3 $\frac{x}{b} - b = \frac{x}{a} - a$ (4)

6.4 $2 \cdot 2^{x+1} = \sqrt[3]{2}$ without a calculator (3)

6.5 $2^{x+1} + 2^{x-1} = 20$ (3)

6.6 $5 \cdot 3^{x+2} = 120$ (3)

6.7 $3x^{\frac{3}{7}} + 4 = 0$ (3)

6.8 $x^2 = 8$ (3)

[23]

QUESTION 7 (JUNE 15 HUD)

7.1.1 Solve for x : $-2 < 2 - 2x \leq 5$ (2)

7.1.2 Express your solution to 6.2.1:

7.1.2.1 on a number line (1)

7.1.2.2 in interval notation (1)

7.2 Solve for x and y :

$$5x - 3y = 12$$

$$8 = 3x - y \quad (4)$$

[8]

QUESTION 1 (MARCH 16)

1.1 Determine the product of the following and simplify fully:
 $(x - 4)(x^2 + 4x + 16)$ (2)

1.2 Factorise the following expression fully:
 $p^2 + 2pq + q^2 - r^2$ (3)

1.3 Simplify the following expression fully:
 $\frac{x}{x^2+3x+2} + \frac{x}{x^2-4}$ (5)

[10]

QUESTION 2 (MARCH 16)

2.1 The total surface area of a closed right cylinder is given by $S = 2\pi r^2 + 2\pi rh$.
 Write down h , the height of the cylinder, in terms of S , π , and r . (2)

2.2 Solve for x and y if:
 $x + 2y = 4$ and $4x + 5y = 1$ (4)

2.3 Solve the following inequality: $1 - 5x > 3x - 7$.
 Hence, illustrate your answer on a number line if x is a real number. (4)

2.4 Solve for x : $(x - 3)(x + 2) = -6$ (4)

2.5 The length of a rectangle is 40cm longer than its breadth. If the area of the rectangle is 1200cm^2 ,
 calculate the length of the rectangle. (4)

[18]

QUESTION 3 (MARCH 16)

If $p + q^{-1} = -3$ and $p^2 + q^{-2} = 6$, calculate the value of $\frac{p}{q}$. (3)

QUESTION 4 (MARCH 16)

4.1 **Without using a calculator**, simplify the following expressions fully:

4.1.1 $(x - y)^0 + \left(\frac{1}{2}\right)^{-2} - 2^{-5}$ (4)

4.1.2 $\frac{6^{x-2} \cdot 2^{x+2}}{4^x \cdot 3^{x-4}}$ (4)

4.2 Solve for x in of the following equations:

4.2.1 $5^x = 1$ (1)

4.2.2 $2^{x+1} - 2^x = 6$ (3)

[12]

QUESTION 5 (MACH 16)

If $5^x = 25$, determine the value of 5^{x-2} (3)

QUESTION 6 (MARCH 16)

The area of a square is 45 cm^2 .

6.1 Is the length of the side of the square a rational number or an irrational number? Explain your answer. (2)

6.2 Without calculating the length of the side of the square, show that its value lies between 6 and 7.

[4]

QUESTION 1 (JUNE 13 HUD)

A calculator may not be used in this question.

1.1 Complete the following table using Y (Yes) and N (No).

	\mathbb{R}	\mathbb{Q}	\mathbb{Z}
4	Y	Y	Y
$\frac{3 - \sqrt{17}}{2}$			

(1)

1.2 If x is a positive \mathbb{Z} write down one value for x so that

$$\sqrt{\frac{8}{4-x}}$$
 Will be:

1.2.1 Rational (1)

1.2.2 Non- Real (1)

1.2.3 Equal to zero (1)

1.2.4 Undefined (1)

1.3 Between which two consecutive natural numbers does $\sqrt[3]{35}$ lie. Show all your working out. (3)

1.4 Write $1, \dot{2}\dot{8}$ as an improper fraction. Show all your working out. (3)

[11]

QUESTION 2 (JUNE 13 HUD)

2.1 Multiply out then simplify the following:

2.1.1 $4(x - 3)x + 3x$ (2)

2.1.2 $(4a^2 + 6ax + 9a^2)(2a - 3x)$ (2)

2.1.3 $(n^{4p} - 1)^2$ (2)

2.2 What is the value of d , if $(2x - 3)$ is a factor of $6x^2 + dx - 12$? (2)

[8]

QUESTION 3 (JUNE 13 HUD)

Factorise the following fully:

3.1 $4x^2 - 36$ (2)

3.2 $16x^2 + \frac{y^3}{4}$ (2)

3.3 $6(m - n)a^2 - 5(n - m)a - n + m$ (4)

3.4 $2x^3 + x^2 - 6x - 3$ (3)

3.5 $3^n + 3^{n+2}$ (2)

3.6 $6 \cdot 5^{2x} + 5^x - 12$ (3)

3.7 $x^{\frac{1}{2}} - 5x^{\frac{1}{4}} + 6$ (2)

QUESTION 4 (JUNE 13 HUD)

4.1 Simplify the following, without the use a calculator:

$$\frac{12^x \times 9^{x+1}}{4^{x-1} \times 27^x} \quad (3)$$

4.2 Write the following as a single term:

$$\frac{3a+1}{5} - \frac{2a-1}{10} \quad (2)$$

4.3 Simplify fully:

$$\frac{\frac{1}{x} - \frac{1}{y}}{1 - \frac{x}{y}} \quad (4)$$

QUESTION 5 (JUNE 13 HUD)

Solve for x in each of the following:

5.1 $x^2 - 4x = 0$ (2)

5.2 $\frac{x-1}{x+2} = \frac{x+2}{3x}$ (5)

5.3 $4x^2 = 2(5x + 3)$ (4)

5.4 $2x^2 - 3 = 0$ (3)

5.5 $(2^x + 1)(2^x - 3) = 0$ (4)

5.6 $4x^{\frac{-3}{2}} = 7$ (2)

[20]

QUESTION 6 (JUNE 13 HUD)

- 6.1.1 Solve for x : $5 \leq 1 - 2x < 11$ (2)
- 6.1.2 Write your answer to 6.1.1 in interval notation (2)
- 6.1.3 Represent your answer to 6.1.1 on a number line (1)
- 6.2 Solve for x and y repectively
- Given:
- $$2x = 3y + 5$$
- $$3x + 6y = 12$$
- (4)
- [9]

QUESTION 1 (MAY 07 BISHOPS)

- 1.1 $0,1$ $\sqrt{2}$ $\sqrt{3,6}$ $-\sqrt{7}$ $\frac{4}{7}$ $\frac{1}{\sqrt{5}}$ $\frac{\sqrt{3}}{2}$ $0,4$ π
- From the numbers above write down
- (a) two rational numbers
- (b) a positive irrational less than $\frac{1}{2}$
- (c) the biggest
- (d) the one nearest in value to 1
- (e) a number whole square is irrational (6)
- 1.2.1 Which integer is closest to $\sqrt{31}$? (1)
- 1.2.2 Write down in exact form an irrational number between 4 and 5. (2)
- 1.3 A decimal fraction starts 1,5 ; after that each successive digit is the remainder when four times the previous digit is divided by 7.
- (a) Find the first 6 *d. p* of this fraction (3)
- (b) Express $1, \dot{5} 6 \dot{3}$ as a rational number (4)
- [16]

QUESTION 2 (MAY 07 BISHOPS) 12 marks

- 2.1 Multiply out and simplify $(x - 1)(x^2 + 3x - 2)$ (2)
- Factorise
- 2.2.1 $4a^2 + 2a$ (1)
- 2.2.2 $4a^2(x - 4) - b^2(4 - x)$ (3)
- 2.2.3 $x^2(x - 1) + 2x(x - 1) - 3(x - 1)$ (3)

$$2.2.4 \quad 2a^2 - 6ab - 20b^2 \quad (3)$$

QUESTION 3 (MAY 07 BISHOPS)

3.1 Solve for x if

$$3.1.1 \quad 3(x - 1) - 2(x - 3) = 6x \quad (2)$$

$$3.1.2 \quad \frac{3}{x-2} = \frac{4}{x-3} \quad (3)$$

$$3.1.3 \quad 2x^2 - x(x + 1) = (x - 3)(x - 2) \quad (4)$$

3.2 The numerator of a fraction is smaller than the denominator by 3. If the numerator is now increased by 5, the value of the fraction increases by 1. Set up an equation and hence determine what the original fraction was. (5)

[14]

QUESTION 4 (MAY 07 BISHOPS)

4.1 Make x the subject of $\frac{ax-b}{c} = T$ (3)

4.2 Given an object, a lens and the image of the object formed by the lens, if the object itself is at a distance u from the lens, and the focal length of the lens is f , then the distance away from the lens of the image is v where

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

Show how we can change this formula so as to be able to calculate v for any values of f and u (4)

[7]

QUESTION 5 (MAY 07 BISHOPS)

5.1 Solve for x if

$$5.1.1 \quad (3 - x)(x + 2) = 0 \quad (2)$$

$$5.1.2 \quad x^2 - 2x = 8 \quad (2)$$

$$5.1.3 \quad 20 + x^2 - 3x = (2x - 1)(x + 4) \quad (4)$$

5.2 Solve for x if $x + \frac{4}{x} = 4$ (4)

[12]

QUESTION 6 (MAY 07 BISHOPS)

6.1 Solve the following inequality and illustrate your answer on a number line:
 $3(x - 1) + 5(3 - x) \leq 8 - x$ (4)

6.2 If the length of the rectangle is $x + 4$ and its breadth is x , and the sides of the square are given by $x + 1$. It is known that the area of the rectangle is greater than the area of the square. Find the possible values of x . (4)

[8]

QUESTION 7 (MAY 07 BISHOPS)

7.1 Simplify

$$7.1.1 \quad \frac{x^2-2xy}{x^2-4y^2} \quad (3)$$

$$7.1.2 \quad \frac{2x^2+7x+3}{x-5} \div \frac{x^2-9}{x-5} \quad (4)$$

$$7.1.3 \quad \frac{1+\frac{1}{x}}{\frac{1}{x}} \quad (3)$$

$$7.2 \quad \text{If it is known that } x^2 + y^2 = 1, \text{ find the value of } \frac{x}{y} + \frac{y}{x} - \frac{1}{xy} \quad (3)$$

[13]

THE END

THANK YOU VERY MUCH FOR READING THIS TUTORIAL.

