ALGEBRA (Q 1 & 2, PAPER 1)

LESSON NO. 6: OTHER TYPES OF EQUATIONS

2002

1 (a) Solve the equation $x = \sqrt{x+2}$.

SOLUTION

STEPS
1. Isolate the square root.
2. Square both sides.
3. Solve for *x*.
4. Check your answers.

$x = \sqrt{x+2} \Rightarrow x^2 = x+2$ [Squaring both sides.]

$\Rightarrow x^2 - x - 2 = 0 \Rightarrow (x+1)(x-2) = 0 \Rightarrow x = -1,\ 2$

Check both solutions.

$x = -1: -1 = \sqrt{-1+2} \Rightarrow -1 = \sqrt{1}$ [This is incorrect. Therefore, $x = -1$ is not a solution.]

$x = 2:\ 2 = \sqrt{2+2} \Rightarrow 2 = \sqrt{4}$ [This is correct. Therefore $x = 2$ is a solution.]

ANSWER: $x = 2$

2005

2 (a) Solve for *x*: $|x-1| = 7$, where $x \in \mathbf{R}$.

SOLUTION

STEPS
1. Remove the bars and put $\pm$ on one side.
2. Solve each equation.

1. $x - 1 = \pm 7$

2. $x - 1 = 7 \Rightarrow x = 8$ | $x - 1 = -7 \Rightarrow x = -6$

ANS: $x = -6,\ 8$

2003

2 (c) (i) Solve for *y*: $2^{2y+1} - 5(2^y) + 2 = 0$.

SOLUTION

STEPS: SOLVING SUMS OF EXPONENTIAL FUNCTIONS
1. Isolate the common exponential function by putting it in brackets.
2. Make a substitution by putting the object inside the bracket equal to a letter, say *u*.
3. Solve the resulting quadratic.
4. Find all answers for the original variable.

1. $2^{2y+1} - 5(2^y) + 2 = 0 \Rightarrow 2(2^y)^2 - 5(2^y) + 2 = 0$

2. Let $u = 2^y$

3. $\Rightarrow 2u^2 - 5u + 2 = 0 \Rightarrow (2u-1)(u-2) = 0 \Rightarrow u = \frac{1}{2},\ 2$

4. $u = \frac{1}{2} \Rightarrow \frac{1}{2} = 2^y \Rightarrow 2^{-1} = 2^y \Rightarrow y = -1$

$u = 2 \Rightarrow 2 = 2^y \Rightarrow 2^1 = 2^y \Rightarrow y = 1$

Answer: $y = -1,\ 1$