JUNE 2007

C1 — WORKED SOLUTIONS / NOTES.

SECT. A.

1. Solve $1-2x < 4+3x$ $(-3x)$

$1-5x < 4$ (-1)

$-5x < 3$ $(\div -5)$ → ÷ by a negative number reverses the 'inequality sign'

$x > \frac{3}{-5}$

ans: $x > -0.6$

2. Make t the subject $s = \frac{1}{2}at^2$

rewrite .... $\frac{1}{2}at^2 = s$ (this puts the term with 't' on the L.H.S.)

$(\times 2)$ $2 \times \frac{1}{2}at^2 = 2s$

$(\div a)$ $\frac{at^2}{a} = \frac{2s}{a}$

$(\sqrt{\ })$ $t = \sqrt{\frac{2s}{a}}$

3. the CONVERSE of 'n is an odd integer $\Rightarrow$ 2n is an even integer'

is '2n is an even integer $\Rightarrow$ n is an odd integer'

Show that the CONVERSE is false ...

if $2n = 6$, $n = 3$

but if $2n = 4$, $n = 2$ (NOT an odd integer)

4. $f(x) = x^3 + kx + c$ you are given $f(0) = 6$ and $(x-2)$ is a factor

$f(0) = 0^3 + 0k + c = 6$ $\therefore c = 6$

if $(x-2)$ is a factor $x = 2$ is a ROOT

$f(2) = 2^3 + 2k + 6 = 0$ $\therefore 2k = -14$

$k = -7$

5. find a if $a^3 = 64x^{12}y^3$

take cube root of both sides

$\therefore a = 4x^4y$ (See below).

as $64^{1/3} = 4$ ($64 = 4\times4\times4$)

$x^{12} = x^4 \times x^4 \times x^4$ $\quad (x^{12})^{1/3} = x^4$

$y^3 = y \times y \times y$ $\quad (y^3)^{1/3} = y$

6. find coefficient of x^3 in $(3-2x)^5$

REMEMBER $(a+b)^5$ ← Pascals Δ

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        1   1
      1   2   1
    1   3   3   1
  1   4   6   4   1
1   5  10  10   5   1
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$1a^5b^0 + 5a^4b^1 + 10a^3b^2 + 10a^2b^3 + 5a^1b^4 + 1a^0b^5$

if $a = 3$ $\quad b = (-2x)$ → $10a^2b^3$ will give x^3 term!!

$10a^2b^3 = 10 \times (3)^2 \times (-2x)^3$

$= 10 \times 9 \times -8\, x^3$

$\therefore$ Coefficient of $x^3 \Rightarrow 10 \times 9 \times -8 = -720$

7. $\frac{4x+5}{2x} = -3$ $\quad (\times 2x$ both sides!) $\Rightarrow 4x+5 = -6x$ (re-arrange)

$10x = -5$ $(\div 10)$

$x = -\frac{5}{10}$ $(-\frac{1}{2})$

8(i) $\sqrt{98} - \sqrt{50} = \sqrt{2\times49} - \sqrt{2\times25}$

$= 7\sqrt{2} - 5\sqrt{2} = \underline{2\sqrt{2}}$

$(\sqrt{8})$

(ii) $\dfrac{6\sqrt{5}}{(2+\sqrt{5})} \times \dfrac{(2-\sqrt{5})}{(2-\sqrt{5})} = \dfrac{6\sqrt{5}(2-\sqrt{5})}{4 \{-2\sqrt{5}+2\sqrt{5}-5}$

$= \dfrac{12\sqrt{5} - 6\sqrt{5}\sqrt{5}}{-1}$

$= 6\times5 \quad -12\sqrt{5}$

$= \underline{30 - 12\sqrt{5}}$

9. (i) $y = x^2 - 4$ find values of x where $y = 21$

$x^2 - 4 = 21 \Rightarrow x^2 - 25 = 0$

$(x+5)(x-5) = 0$

$\underline{x = \pm 5}$

(ii) a translation of $\begin{pmatrix}2\\0\end{pmatrix}$ is 2units to the right

algebraically ... $\underline{y = (x-2)^2 - 4}$

10. Area of $\Delta = \frac{1}{2}$ base x ht $= \frac{1}{2}(2x-3)(x+1)$ {$= 9$ → you are told this!}

$(\times 2) \quad (2x-3)(x+1) = 18$

$2x^2 - x - 3 - 18 = 0$

$2x^2 - x - 21 = 0$

$(2x-7)(x+3) = 0 \Rightarrow x = -3$ and $7/2$ {discard the -ve soln.}

Subst $x = 7/2 \quad \therefore 2x - 3 = 4$ [BASE]

$x + 1 = 4\frac{1}{2}$ [HEIGHT]