JAN 2005

C1 SECT. A.

1. $2(x-3) < 6x + 15$

$2x - 6 < 6x + 15$

$2x - 6x < 15 + 6$

$-4x < 21$ ÷ by -ve no. REVERSES SIGN

$x > \frac{21}{-4}$

$x > -5\frac{1}{4}$

2. $V = \frac{4}{3}\pi r^3$

$\cancel{\frac{3}{4}} \times \cancel{\frac{4}{3}} \pi r^3 = V \times \frac{3}{4}$

$\frac{\pi r^3}{\pi} = \frac{3}{4}\frac{V}{\pi}$ $(\div \pi)$

$r^3 = \frac{3V}{4\pi}$ $(\sqrt[3]{\ })$

$r = \sqrt[3]{\frac{3V}{4\pi}}$ → $\left(\text{or } \left(\frac{3V}{4\pi}\right)^{1/3}\right)$

3. P : n is an even number

Q : n is a multiple of 4

choose $P \Rightarrow Q$ $P \Leftarrow Q$ $P \Leftrightarrow Q$???

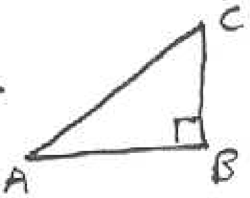
NOT $P \Rightarrow Q$ as "2 (even) IS NOT a multiple of 4"

SO CAN'T BE $P \Leftrightarrow Q$ either!!

ANSWER: $P \Leftarrow Q$; TRUE, as a multiple of 4 is EVEN!

P: B is a right angle

Q: $AB^2 + BC^2 = AC^2$



ANSWER: $P \Leftrightarrow Q$; (see diagram ... Pythagoras Th works with a right angled Δ !)

4. Find coefficient of x^3 in $(2+3x)^5$

the x^3 term is $\binom{5}{2} \times 2^2 (3x)^3$

$$\binom{5}{2} = \frac{5!}{2!\,3!} = \frac{5 \times \cancel{4}^{2} \times \cancel{3} \times \cancel{2} \times \cancel{1}}{\cancel{2} \times 1 \times \cancel{3} \times \cancel{2} \times \cancel{1}} = 10.$$

$\therefore$ coeff of x^3 is $10 \times 2^2 \times (3x)^3$

$10 \times 4 \times 2 \qquad = 1080x^3$

Ans: 1080

OR

$$(a+b)^5 = 1a^5 + 5a^4b^1 + 10a^3b^2 + 10a^2b^3 + 5a^1b^4 + 1b^5$$

REMEMBER PASCAL'S Δ

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

with $a = 2 \quad b = 3x$

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

hence coeff. of $x^3 = 10 \times 4 \times 3^3 = \underline{\underline{1080}}$

5. $\left(\frac{1}{3}\right)^{-2} = \frac{1}{(1/3)^2} = \frac{1}{1/9} = \underline{9}$

$16^{3/4} = \left(16^{1/4}\right)^3 = 2^3 = \underline{\underline{8}}$

NOTE: don't use $\left(16^3\right)^{1/4}$ .... the number 16^3 would be too big to handle!!

6. line L is // to $y=-2x+1$
and passes thro' $(5,2)$
Where does Line L cross the axes?

Line L has a gradient of -2 (as it is // to $y=-2x+1$)

eqn of Line L ...
$$y-y_1 = m(x-x_1)$$
$$y-2 = -2(x-5)$$
$$y-2 = -2x+10$$
$$y = -2x+12$$

when $x=0$ $y=12$; $(0,12)$ on y axis
when $y=0$ $2x=12$ $x=6$; $(6,0)$ on x axis

7. give x^2-6x in $(x-a)^2-b$ form.
$$x^2-6x = (x-3)^2-9 \Rightarrow a=3 \quad b=9.$$
[check. $(x-3)^2 = x^2-6x+9$; So -9 to cancel out the $+9$.]

if $x^2-6x = (x-3)^2-9$ Minimum pt is $(3,-9)$

Solving $x^2-6x=0$ gives crossing pts on x axis!
$$x(x-6)=0$$
$$\therefore x=0 \text{ and } x=6$$

So points of intersection with axes are $(0,0)$ and $(6,0)$

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8. find eqⁿ of line passing thro'
A(3,7) and B(5,-1)

$$M_{AB} = \frac{7-(-1)}{3-5} = \frac{8}{-2} = \underline{\underline{-4}}$$

using $y = mx + c$ with $x=3$ $y=7$ and $m=-4$

$$7 = -4 \times 3 + c \Rightarrow c = 19$$

So eqn of line is $\underline{\underline{y = -4x + 19}}$

OR

using $y - y_1 = m(x - x_1)$ with A(3,7)

$$y - 7 = -4(x-3)$$

$$\Rightarrow \underline{\underline{y = -4x + 19}}$$

mid.pt. of AB is $\left(\frac{3+5}{2}, \frac{7+(-1)}{2}\right) = (4,3)$

Subst. $x=4$ $y=3$ into $x+2y$

$$\rightarrow 4 + 2\times 3 = 4+6 = 10$$

So $\underline{\underline{(4,3) \text{ lies on } x+2y=10}}$

9. $(3+\sqrt{2})(3-\sqrt{2}) = 3\times 3 + 3\sqrt{2} - 3\sqrt{2} - \sqrt{2}\times\sqrt{2}$
$= 9 - 2 = \underline{7}$

$$\frac{(1+\sqrt{2})}{(3-\sqrt{2})} \times \frac{(3+\sqrt{2})}{(3+\sqrt{2})} = \frac{(1+\sqrt{2})(3+\sqrt{2})}{7} = \frac{3+3\sqrt{2}+1\sqrt{2}+\sqrt{2}\sqrt{2}}{7}$$

$$= \frac{5+4\sqrt{2}}{7} = \underline{\underline{\frac{5}{7}+\frac{4}{7}\sqrt{2}}}$$

From first part