JUNE 2006

C1 SECT A.

1. $V = \frac{1}{3}\pi r^2 h$, make r the subject ....

$\frac{1}{3}\pi r^2 h = V$ $(\div \pi h)$

$\frac{1}{3} r^2 = \frac{V}{\pi h}$ $(\times 3)$

$r^2 = \frac{3V}{\pi h}$ $(\sqrt{})$

$r = \sqrt{\frac{3V}{\pi h}}$

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2. $x^3 + ax^2 + 7 = 0$ has $x = -2$ as a ROOT

$\therefore f(-2) = (-2)^3 + a(-2)^2 + 7 = 0$

$\Rightarrow -8 + 4a + 7 = 0$

$4a = 1$ $a = 1/4$

3. eqn of line is $3x + 2y = 6$ $\left(2y = 6 - 3x\right.$
$\left. y = 3 - \frac{3}{2}x \right)$

$\therefore$ gradient is $-3/2$

another line, // to first so same GRADIENT

goes thro' $(2, 10)$

$\therefore$ eqn $y - 10 = -3/2\,(x - 2)$

$y = -3/2\, x + \frac{6}{2} + 10$

$y = -3/2\, x + 13$ $\{(\times 2)$ and re-arranging EXTRA!!

$3x + 2y = 26$

4. $P \Rightarrow Q \quad P \Leftrightarrow Q \quad P \Leftarrow Q$

(i) $P: \; x^2 + x - 2 = 0$

$Q: \; x = 1$

solving P gives two solns so can't be $P \Rightarrow Q$

so.... $P \Leftarrow Q$ as if $x = 1$ satisfies $x^2 + x - 2 = 0$

also $P \Leftrightarrow Q$ as a soln. of $x^2+x-2=0$ is $x = 1$.

5. Sim. EQNS. $y = 3x+1 \quad x + 3y = 6$

Subst. $y = 3x+1$ into $x + 3y = 6$

$$x + 3(3x+1) = 6$$

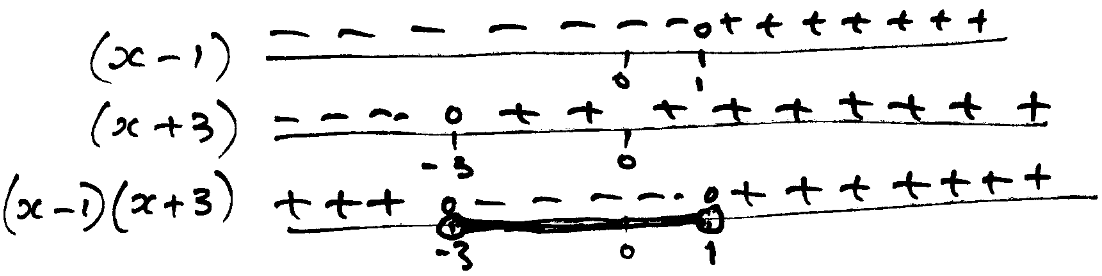
$$10x + 3 - 6 = 0$$

$$10x - 3 = 0 \quad x = 3/10$$

$x = 3/10 \quad y = 3 \times 3/10 + 1 = \frac{19}{10}$

6. $x^2 + 2x < 3 \Rightarrow x^2 + 2x - 3 < 0$

$$(x-1)(x+3) < 0$$



from the 'SIGN DIAGRAM' $(x-1)(x+3) < 0$

when $-3 < x < 1$

7.

(i) $6\sqrt{2} \times 5\sqrt{3} - \sqrt{24}$

$6 \times 5 \times \sqrt{2}\sqrt{3} - \sqrt{4 \times 6}$

$30\sqrt{6} - 2\sqrt{6} = \underline{\underline{28\sqrt{6}}}$

(ii) $(2 - 3\sqrt{5})^2 = (2 - 3\sqrt{5})(2 - 3\sqrt{5})$

$= 4 - 2 \times 3\sqrt{5} - 2 \times 3\sqrt{5} + 3 \times 3 \times \sqrt{5} \times \sqrt{5}$

$= 4 - 12\sqrt{5} + 45$

$\underline{\underline{= 49 - 12\sqrt{5}}}$

8. $^6C_3 = \dfrac{6!}{3!(6-3)!} = \dfrac{\overset{2}{\cancel{6}} \times 5 \times \overset{2}{\cancel{4}} \times \cancel{3} \times \cancel{2} \times \cancel{1}}{\cancel{3} \times \cancel{2} \times 1 \times \cancel{3} \times \cancel{2} \times \cancel{1}}$

$= \underline{\underline{20}}$

coeff of x^3 in $(1-2x)^6$

[note Pascal's Δ: 1 6 15 20 15 6 1]

don't forget the (-2) gets cubed as well!!

x^3 term is $20 \times (-2x)^3 = (20 \times -8)\,x^3$

ans: coeff of x^3 is $\underline{-160}$

9.(i) $\dfrac{16^{1/2}}{81^{3/4}} = \dfrac{\sqrt{16}}{(\sqrt[4]{81})^3} = \dfrac{4}{3^3} = \underline{\underline{\dfrac{4}{27}}}$.

(ii) $\dfrac{12\,(a^3 b^2 c)^4}{4a^2c^6} = \dfrac{12a^{12}b^8c^4}{4a^2c^6} = 3a^{10}b^8c^{-2}$ or

$$\underline{\underline{\left(\frac{3a^{10}b^8}{c^2}\right)}}$$

10. Find coordinates of points of intersection of

$y = 3x$ with $x^2 + y^2 = 25$

Subst. for y $\quad x^2 + (3x)^2 = 25$

$$10x^2 = 25$$

$$x^2 = 25/10 \;(= 5/2)$$

$$x = \pm\sqrt{5/2}$$

Subst into $y = 3x$

$y = 3 \times \sqrt{\dfrac{5}{2}}$ and $y = 3 \times -\sqrt{5/2}$

Hence $\left(\sqrt{5/2}\,,\, 3\sqrt{5/2}\right)$ and $\left(-\sqrt{\dfrac{5}{2}}\,,\, -3\sqrt{\dfrac{5}{2}}\right)$