Intermediate 2 Units 1, 2, 3 Paper 1 2003

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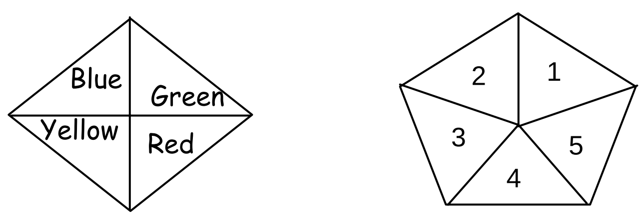
Graduate Bsc (Hons) MathsSci (Open) GIMA

1. Given $(2a-b)(3a+2b)$

Multiplying out and gathering like terms we have:

$$(2a-b)(3a+2b)$$
$$=2a(3a+2b)-b(3a+2b)$$
$$=6a^2+4ab-3ab-2b^2$$
$$=6a^2+ab-2b^2$$

2. Given the two spinners.



(a) Completing table we get:

	1	2	3	4	5
Red	R,1	R,2	R,3	R,4	R,5
Yellow	Y,1	Y,2	Y,3	Y,4	Y,5
Blue	B,1	B,2	B,3	B,4	B,5
Green	G,1	G,2	G,3	G,4	G,5

(b) Probability that we have p(Red, Even) = $\frac{2}{20}=\frac{1}{10}$

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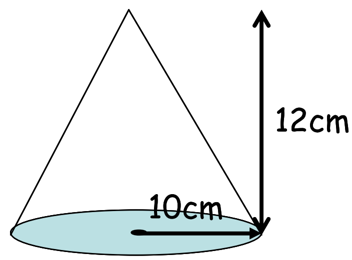
3. Given the diagram. The volume for this cone will be:

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

$$V = \frac{1}{3}\pi \times 10^2 \times 12$$

$$V = 1256 cm^3$$



4. Given the stem leaf diagram represents waiting times for Quickcars:

Waiting times (minutes)

0	6 7
1	2 3 4
2	5 6 9 9
3	2 5 7
4	2 4

n = 14
1|3 represents 13 minutes

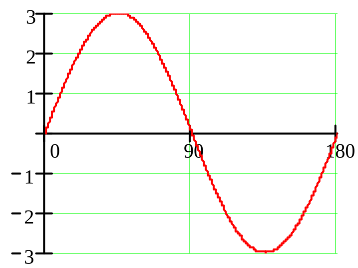
(a) Calculating the median, lower and upper quartiles we have:

$$median = \frac{26+29}{2} = 27.5 \quad lower \ = 13 \quad upper \ = 35$$

(b) Semi-interquartile range is: $\frac{y_2 - y_1}{x_2 - x_1} = \frac{Q_3 - Q_1}{2} = \frac{35-13}{2} = 11$

(c) If FastCabs have a semi-interquartile of 2.5 then they are more consistent because data is less spread out.

5. Given that the graph represents a function of the form y = a sin bx^{o}



The values for a and b are 3 and 2 respectively.

6. Expressing $\frac{\sqrt{40}}{\sqrt{2}}$ as a surd in its simplest form we get:

$$\frac{\sqrt{40}}{\sqrt{2}} = \frac{\sqrt{4}\sqrt{10}}{\sqrt{2}} = \frac{2\sqrt{2}\sqrt{5}}{\sqrt{2}} = 2\sqrt{5}$$

(b) Simplifying $\frac{2x+2}{(x+1)^2}$ we get:

$$\frac{2x+2}{(x+1)^2} = \frac{2(x+1)}{(x+1)^2} = \frac{2}{(x+1)}$$

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7. Given the two concentric circles.

AB is a tangent to the small circle and a chord to the big circle.

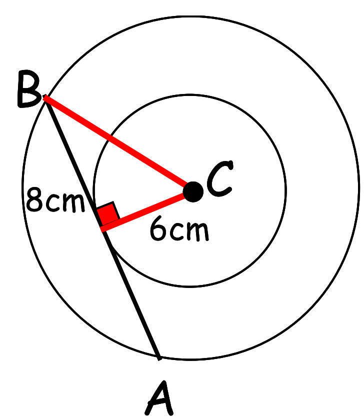
Also AB measures 16cm.

Red values have been added to diagram since they are easily calculated.

Since AB is a tangent radius of the small circle makes a right angle with the chord AB as shown. It also bisects (halves) AB.

Using Pythagoras Theorem or recognising a Pythagorean triple we have:

$$c^2 = a^2 + b^2$$
$$c = \sqrt{8^2 + 6^2}$$
$$c = 10cm$$



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8. (a) Factorising $7+6x+-x^2$
Using FOIL (or any other suitable method) we get:

$$7+6x-x^2$$
$$=(7-x)(1+x)$$

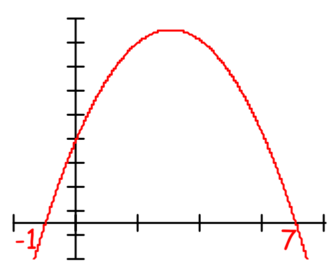
(b) The roots of $7+6x+-x^2$ are:

$$(7-x)=0 \qquad (1+x)=0$$
$$x=7 \qquad x=-1$$

(c) Given the graph of $7+6x+-x^2$

Red values have been added to diagram using information obtained in part (b).

By symmetry the x coordinate is 3.



y coordinate is given by:

$$y=7+6\times3-3^2=16$$

Maximum turning point occurs at (3, 16)