1. $5000 \times 1.006^3 = 5090.54\ldots$

   $= 5090$ (3 sig figs)

2.

	x	$x - \bar{x}$	$(x - \bar{x})^2$
	49	3	9
	44	-2	4
	41	-5	25
	52	6	36
	47	1	1
	43	-3	9
TOTAL	276		84

a) Mean $= \dfrac{\sum x}{n} = \dfrac{276}{6} = 46$

b) S.D. $= \sqrt{\dfrac{84}{5}} = \sqrt{16.8} = 4.09\ldots = 4.1$

c) The price of the milk is more variable.
   The price of the sugar is more consistent.

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3. Draw a diagram, and mark in given bearings

   which show that $\angle AHB = 68°$ ($140° - 72°$)
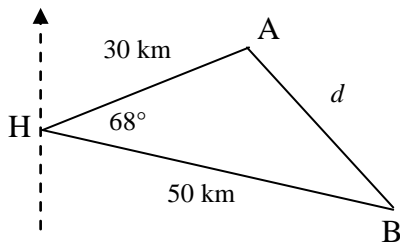
   Look at diagram - SAS - Cosine Rule

   $d^2 = 30^2 + 50^2 - 2 \times 30 \times 50 \times \cos 68°$

   $d^2 = 3400 - 1123.819\ldots = 2276.181\ldots$

   d $= 47.70933\ldots$

   yachts are 47.7 km apart when they stopped.

---

4. a) Vol $= \pi r^2 h = \pi \times 5^2 \times 14 = 1099.557\ldots$

   $= 1100$ cm^3 (3 sig figs) *[note: d = 10 so r = 5]*

   b) $600 = \pi r^2 h \qquad 600 = \pi 5^2 \times h$

   $h = \dfrac{600}{25\pi} \qquad h = 7.639\ldots$

   depth of coffee $= 7.6$ cm (1 d.p.)

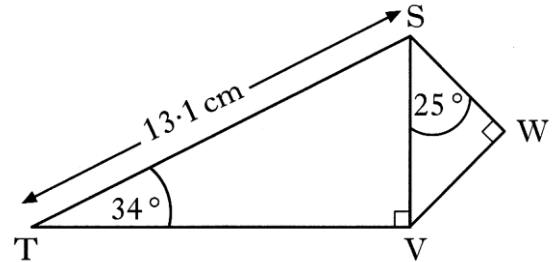5. Using a formula

   $d = \dfrac{n(n-3)}{2} \quad \rightarrow \quad 20 = \dfrac{n(n-3)}{2}$

   $\rightarrow \quad 40 = n(n-3) \quad \rightarrow \quad 40 = n^2 - 3n$

   $\rightarrow \quad n^2 - 3n - 40 = 0 \quad \rightarrow \quad (n+5)(n-8) = 0$

   So $n = -5$, or 8

   Polygon has 8 sides (-5 is not possible – discard)

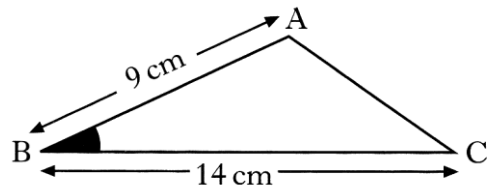---

6.

   Use SOH-CAH-TOA (twice)

   Find SV and then SW

   In ΔSTV $\dfrac{SV}{13.1} = \sin 34 \rightarrow SV = 13.1\sin 34$

   SV $= 7.3254\ldots$ centimetres

   In ΔSWV $\dfrac{SW}{SV} = \cos 25 \rightarrow SW = 7.33\cos 25$

   SW $= 6.643\ldots = 6.6$ centimetres (1 d.p.)

7.

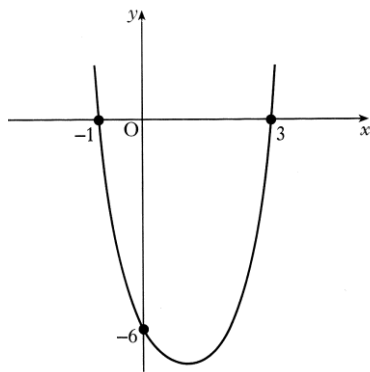
   Area of triangle $= = \dfrac{1}{2} ab \sin C$

   Transpose letters.

   $38 = ½ \times 9 \times 14 \times \sin B \qquad 38 = 63 \sin B$

   Re-arrange: $\sin B = \dfrac{38}{63} \quad B = \sin^{-1} (38 \div 63)$

   Hence B $= 37.096\ldots \qquad$ B $= 37°$

8.

$$y = k(x-a)(x-b)$$

a) *a* and *b* are where the graph cuts the *x*-axis.

   $a = -1$ and $b = 3$

b) Put these values in equation

   $$y = k(x-(-1))(x-3) \quad y = k(x+1)(x-3)$$

   Now choose a point on the curve

   Do **NOT** choose on the *x*-axis since $y = 0$,
   this will not be of much use to you.

   Choose point $(0, -6)$
   This point lies on the curve,
   so it satisfies equation of the curve.

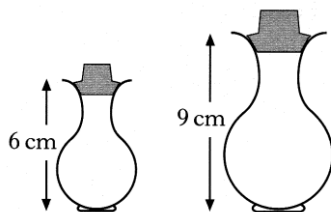 $$-6 = k(0+1)(0-3) \rightarrow -6 = -3k$$

   So $k = 2$

c) min. turning point lies on axis of symmetry
   mid way between roots. $x = 1$

   when $x = 1$, $y = 2(1 + 1)(1 - 3)$ $y = -8$

   co-ords of min t.p. are $(1, -8)$

9.
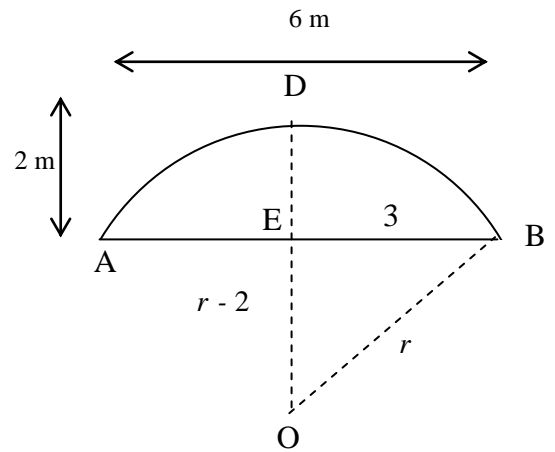

Linear Scale factor $= \dfrac{9}{6} \rightarrow \dfrac{3}{2}$

Scale factor for volume must be cubed.

Vol of perfume $= 30 \times \dfrac{3}{2} \times \dfrac{3}{2} \times \dfrac{3}{2} = 101.25 \; mls$

10.

Let OB (radius) $= r$

EB $= 3$ metres   *(symmetry – half width of shelter)*

OD $= r$ metres   *(also the radius)*

Hence,   OE $= r - 2$ metres

By Pythagoras, $r^2 = (r-2)^2 + 3^2$

$$r^2 = (r-2)(r-2) + 9$$
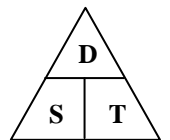
$$r^2 = r^2 - 4r + 4 + 9$$

$$4r = 13$$

$$r = 3.25 \text{ metres}$$

11. This question was disallowed in the examination
because of the inconsistency of units – kph and miles.

However the following solution is offered, making
the assumption that units are miles and mph.

a)   Time =

   Distance ÷ Speed $= \dfrac{x}{75}$

b)   Average Speed = Total Distance ÷ Total Time

   Average Speed $= 2x \div \left(\dfrac{x}{75} + \dfrac{x}{50} \right)$

   $\underset{\substack{\text{Total} \\ \text{Distance}}}{} \qquad \underset{\substack{\text{Total} \\ \text{Time taken}}}{}$

   Average Speed $= 2x \div \left(\dfrac{2x}{150} + \dfrac{3x}{150} \right)$

   $\rightarrow \; 2x \div \left(\dfrac{5x}{150} \right) \rightarrow 2\cancel{x} \times \dfrac{\cancel{150}^{30}}{\cancel{5}^{1} \, \cancel{x}}$

   $= 60 \text{ mph.}$

END OF QUESTION PAPER   *(Rev. March 2007)*