

CREDIT 2007 PAPER 2 SOLUTIONS

1. Value = £600 × 1.045³
= £684.70

2. $3x^2 - 2x - 10 = 0$

$a = 3$ $b = -2$ $c = -10$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-10)}}{2(3)}$$

$$x = \frac{4 \pm \sqrt{4 + 120}}{6}$$

$$x = \frac{4 \pm \sqrt{124}}{6}$$

enter brackets on calculator

either $x = \frac{(4 + \sqrt{124})}{6}$ or $x = \frac{(4 - \sqrt{124})}{6}$

$$x = 2.523$$

$$x = -1.189$$

$\Rightarrow x = -1.2, 2.5$ to 2 sig. fig.

3. (a)*

x	$x - \bar{x}$	$(x - \bar{x})^2$
28	4	16
32	8	64
14	-10	100
19	-5	25
18	-6	36
26	2	4
31	7	49

$$\sum x = 168$$

$$\begin{aligned}\bar{x} &= \frac{168}{7} \\ &= 24\end{aligned}$$

* Alternative solution below

$$\sum (x - \bar{x})^2 = 294$$

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

$$s = \sqrt{\frac{294}{6}}$$

$$s = \sqrt{49}$$

$$s = 7$$

(a) $\sum x = 168$

$$\begin{aligned}\bar{x} &= \frac{168}{7} \\ &= 24\end{aligned}$$

$$\sum x^2 = 4326$$

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$$

$$s = \sqrt{\frac{4326 - \frac{(168)^2}{7}}{6}}$$

$$s = \sqrt{\frac{4326 - 4032}{6}}$$

$$s = \sqrt{\frac{294}{6}}$$

$$s = \sqrt{49}$$

$$s = 7$$

$$4. \quad \frac{x}{4} - \frac{1}{2} < 5$$

$$x - 2 < 20 \quad (\times 4)$$

$$x < 22$$

$$5. \quad 110\% = \text{£}148.50$$

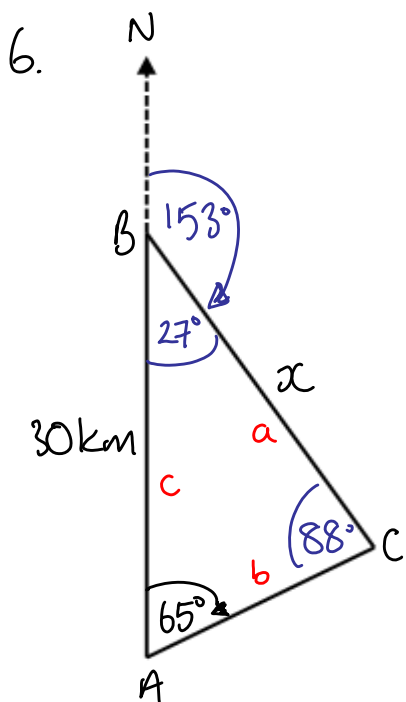
$$1\% = \frac{\text{£}148.50}{110}$$

$$= \text{£}1.35$$

$$100\% = \text{£}1.35 \times 100$$

$$= \text{£}135$$

⇒ Meal cost £135



3 angles & 2 sides ⇒ sine rule

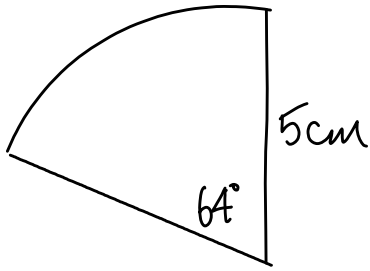
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{x}{\sin 65^\circ} = \frac{30}{\sin 88^\circ}$$

$$x = \frac{30 \sin 65^\circ}{\sin 88^\circ}$$

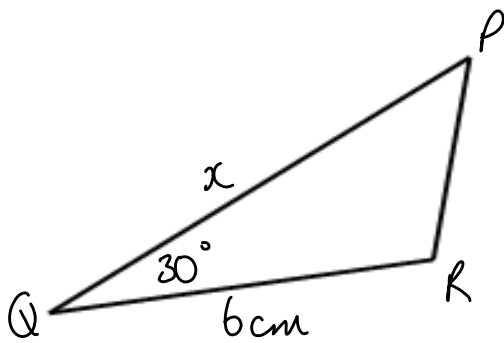
$$x = 27.2 \text{ km}$$

7.

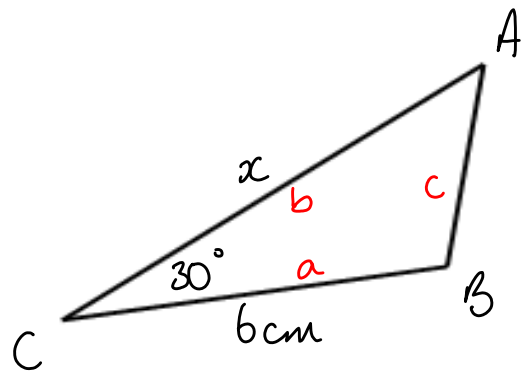


$$\begin{aligned}\text{Sector Area} &= \frac{64^\circ}{360^\circ} \times \pi(5)^2 \\ &= 13.96 \\ &= 14.0 \text{ cm}^2 \text{ to 1 d.p.}\end{aligned}$$

$$\begin{aligned}\text{Total Area of Plastic} &= 14.0 \times 4 \\ &= 56.0 \text{ cm}^2 \text{ to 1 d.p.}\end{aligned}$$

8. Area of a triangle = $\frac{1}{2}ab\sin C^\circ$ 

$$\text{Area} = 15\text{cm}^2$$



$$\Rightarrow 15 = \frac{1}{2} \cdot 6 \cdot x \cdot \sin 30^\circ$$

$$15 = 3x \cdot \frac{1}{2}$$

$$30 = 3x$$

$$10 = x$$

$$\Rightarrow PQ = 10\text{ cm}$$

9.

Copper : Gold

5 : 7

$$\frac{160g}{5} = 32 \quad \Bigg| \quad \frac{245g}{7} = 35$$

$$\Rightarrow \text{maximum gold} = 32 \times 7 \\ = 224g$$

$$\Rightarrow \text{maximum weight of 14 carat gold} \\ = 160g + 224g \\ = 384g$$

10. $5\cos x^\circ + 4 = 0 \quad 0 \leq x < 360^\circ$

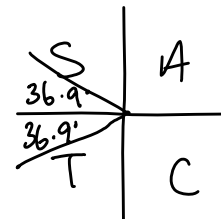
$$5\cos x^\circ = -4$$

$$\cos x^\circ = -\frac{4}{5}$$

$$x^\circ = \cos^{-1}\left(\frac{4}{5}\right)$$

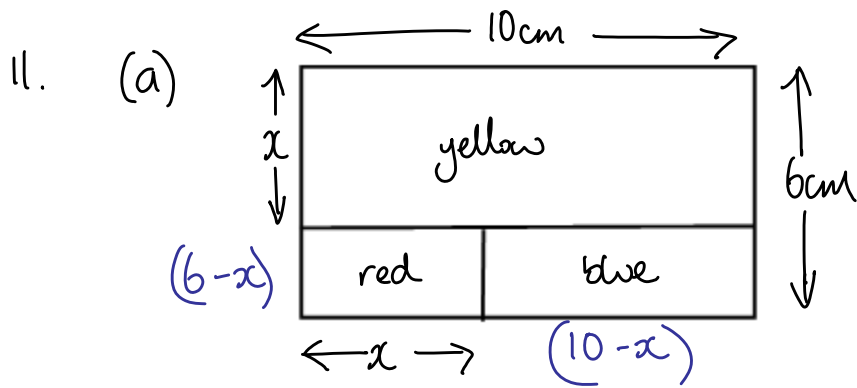
(Acute angle = 36.9°)

$$x^\circ = 143.1^\circ, 216.9^\circ$$



$$180^\circ - 36.9^\circ = 143.1^\circ$$

$$180^\circ + 36.9^\circ = 216.9^\circ$$



$$A = (10-x)(6-x)$$

$$A = 60 - 10x - 6x + x^2$$

$$A = 60 - 16x + x^2$$

$$A = x^2 - 16x + 60$$

(b) Total Area = 10×6
 $= 60 \text{ cm}^2$

$$\Rightarrow x^2 - 16x + 60 = 12$$

$$x^2 - 16x + 48 = 0$$

$$(x-12)(x-4) = 0$$

either $x-12=0$ or $x-4=0$

$$x = 12$$

$$x = 4$$

x must be less than 10 cm,

$$\Rightarrow x = 4 \text{ cm}$$

$$12. (a) V = \pi r^2 h$$

$$V = \pi (3)^2 \cdot 4$$

$$V = 113.1 \text{ cm}^3 \quad (\text{to } 1 \text{ d.p.})$$

$$\text{OR. } V = \pi (3)^2 \cdot 4$$

$$V = 36\pi \text{ cm}^3$$

$$(b) \quad V = \frac{2}{3} \pi r^3$$

$$113.1 = \frac{2}{3} \pi r^3$$

$$339.3 = 2\pi r^3$$

$$\frac{339.3}{2\pi} = r^3$$

$$54 = r^3$$

$$r = \sqrt[3]{54}$$

$$r = 3.8 \text{ cm}$$

$$(\text{to } 1 \text{ d.p.})$$

OR

$$36\pi = \frac{2}{3} \pi r^3$$

$$108\pi = 2\pi r^3$$

$$\frac{108\pi}{2\pi} = r^3$$

$$54 = r^3$$

$$r = \sqrt[3]{54}$$

$$r = 3.8 \text{ cm}$$

$$(\text{to } 1 \text{ d.p.})$$

13. Crosses x -axis when $y = 0$

$$\Rightarrow 4x(140 - x) = 0$$

$$\text{either } 4x = 0 \quad \text{or} \quad 140 - x = 0$$

$$x = 0$$

$$140 = x$$

$$x = 140$$

By symmetry, maximum occurs when $x = 70$

$$\Rightarrow y = 4(70) \cdot (140 - 70)$$

$$y = 280 \times 70$$

$$y = 19\,600$$

\Rightarrow Maximum profit is £19 600