



Subject/Topic:

Date:

(a) $\frac{x}{7} + \frac{x-5}{3} = 1$

$$3x + 7(x-5) = 21$$

$$3x + 7x - 35 = 21$$

$$10x = 56$$

$$x = 5.6 //$$

b) $\frac{6a^3b}{5} \div \frac{3a^2}{10b} = \frac{6a^3b}{5} \times \frac{10b}{3a^2}$

$$= \frac{60a^3b^2}{15a^2}$$

$$= 4ab^2 //$$

c) $x^2 + 4x - 16 = 0$

$$(x + 4\frac{1}{2})^2 - 16 - (4\frac{1}{2})^2 = 0$$

$$(x + 4\frac{1}{2})^2 = 36.25$$

$$x + 4\frac{1}{2} = \pm \sqrt{36.25}$$

$$x = \sqrt{36.25} - 4\frac{1}{2} \quad \text{or} \quad x = -\sqrt{36.25} - 4\frac{1}{2}$$

$$= 1.5208$$

$$= -10.521$$

$$= 1.52 \text{ (2.d.p.)} //$$

$$= -10.52 \text{ (2.d.p.)} //$$

d) $\frac{4x^2 - 8ax - 3x + 6a}{3x^2 - 12a^2} = \frac{4x(x-2a) + 3(2a-x)}{3(x^2-4a^2)}$

$$= \frac{4x(x-2a) - 3(x-2a)}{3(x-2a)(x+2a)}$$

$$= \frac{4x-3}{3(x+2a)} //$$

2a) Both accounts have the same rate per annum but compound interest in account B is calculated based on the principal amount and accumulation interest while simple interest in account A is solely based on the principal amount.

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b) $P + PRT = 1385$
 $P = \frac{1385}{1 + RT}$
 $= \frac{1385}{1 + \left(\frac{1.8 \times 6}{100}\right)}$
 $= 1250_{11}$

c) $P\left(1 + \frac{r}{100}\right)^n = 4719.92$
 $P\left(1 + \frac{1.2}{100}\right)^4 = 4719.92$
 $P = 4719.92 \div \left(1 + \frac{1.2}{100}\right)^4$
 $= 4500.00$
Interest earned = $4719.92 - 4500$
 $= \$219.92_{11}$

d) cost of fuel = $\frac{5.8}{100} \times 745 \times 1.52$
 $= \text{€ } 65.6792$
total cost of car hire and litre in SGD = $\frac{134.50 + 65.6792}{0.66}$
 $= \$303.30$
total amount including
currency conversion = $\frac{101.5}{100} \times 303.30$
 $= \$307.85$ (nearest cent)

3a) median = 41₁₁

i) % aged over 60 = 24%₁₁

iii) 80th percentile = 61₁₁

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3b) number of people under 25 = $\frac{27}{100} \times 4.03 \times 10^6$
 $= 1088000$

c) 1. The population in UK is younger compared to Singapore as UK has a lower median age of 40 compared to the median age of 41 of Singapore

2. The age of population in Singapore is more consistent compared to UK as the interquartile range of age distribution in Singapore is 34, which is lower than the interquartile range of 38 for UK's population.

4a) -3.8

c) $\frac{x^3}{5} - 2x + 1 = k$
 $k = 3.4$ or $k = -1.4$

d) $2x^3 - 25x + 20 = 0$

$x^3 - \frac{25}{2}x + 10 = 0$

$\frac{x^3}{5} - \frac{5}{2}x + 2 = 0$

$\frac{x^3}{5} - 2x + 2 = \frac{x}{2}$

$\frac{x^3}{5} - 2x + 1 = \frac{x}{2} - 1$

Draw $y = \frac{x}{2} - 1$

$x = -3.85$ or $x = 0.85$ or $x = 3.05$

y	-3	-1	1
x	-4	0	4

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$$\begin{aligned} 5 \text{ a)} \quad \text{volume} &= \frac{\pi r^2 h}{2} \\ &= \frac{\pi (3.5)^2 (16)}{2} \\ &= 307.88 \\ &= 308 \text{ cm}^3 \text{ (3sf)} \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad \text{total surface area} &= \frac{2\pi r h}{2} + \pi r^2 + 7 \times 16 \\ &= \frac{2\pi (3.5)(16)}{2} + \pi (3.5)^2 + 112 \\ &= 326.41 \\ &= 326 \text{ cm}^2 \text{ (3sf)} \end{aligned}$$

$$\begin{aligned} \text{bi)} \quad \text{height of cone A : height of cone C} \\ &= \sqrt[3]{1} : \sqrt[3]{8} \\ &= 1 : 2 \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad \text{height of cone B : height of cone C} \\ &= \sqrt[3]{3} : \sqrt[3]{8} \\ &= \sqrt[3]{3} : 2 \end{aligned}$$

$$\frac{\text{surface area of cone B}}{\text{surface area of cone C}} = \left(\frac{\sqrt[3]{3}}{2}\right)^2$$

$$\begin{aligned} \% &= \left(\frac{\sqrt[3]{3}}{2}\right)^2 \times 100\% \\ &= 52.002 \\ &= 52.0\% \text{ (3sf)} \end{aligned}$$

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$$\begin{aligned} \text{6a) } \angle DPE &= \angle CPF \text{ (vert opp } \angle\text{s)} \\ &= 96^\circ \end{aligned}$$

$$\begin{aligned} \angle DEP &= \frac{180^\circ - 96^\circ}{2} \text{ (isos } \Delta\text{)} \\ &= 42^\circ \end{aligned}$$

$$\text{b) } \angle DCF = 90^\circ \text{ (} \angle \text{ in semicircle)}$$

$$\angle CBA = 90^\circ \text{ (} \angle \text{ in semicircle)}$$

$$\angle DCF = \angle CBA$$

$$\begin{aligned} \angle CDF &= 180^\circ - 42^\circ - 90^\circ \text{ (sum of } \angle \text{ in } \Delta\text{)} \\ &= 48^\circ \end{aligned}$$

$$\begin{aligned} \angle BCF &= 180^\circ - 90^\circ \text{ (} \angle \text{ s in a straight line)} \\ &= 90^\circ \end{aligned}$$

$$\begin{aligned} \angle BCA &= 180^\circ - 42^\circ - 90^\circ \text{ (sum of } \angle \text{ in } \Delta\text{)} \\ &= 48^\circ \end{aligned}$$

$$= \angle CDF$$

$\therefore \triangle ABC$ is similar to $\triangle FCD$ (AA)

$$\text{ci) } \tan \angle CED = \frac{CD}{DE}$$

$$CD = 7.21 \tan 42^\circ$$

$$\begin{aligned} BC &= 9.1 - 7.21 \tan 42^\circ \\ &= 2.6081 \end{aligned}$$

$$\tan \angle ACB = \frac{AB}{BC}$$

$$AB = \tan 48^\circ (2.6081)$$

$$= 2.8966$$

$$= 2.90 \text{ cm (3sf)}$$

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ii) $\angle BAC = 180^\circ - 48^\circ - 96^\circ$ (sum of \angle in Δ)

$$= 42^\circ$$

$\angle AOB = 180^\circ - 42^\circ \times 2$ (isos Δ)

$$= 96^\circ$$

$$\sin 48 = \frac{AB}{AC}$$

$$AC = \frac{2.8966}{\sin 48}$$

$$AO = \frac{2.8966}{2 \sin 48}$$

minor arc length $= \frac{96^\circ}{360^\circ} \times 2\pi \left(\frac{2.8966}{2 \sin 48} \right)$

$$= 3.2654$$

$$= 3.27 \text{ cm (3sf)}_{11}$$

7a) $EX = \frac{3}{8} \times 24$

$$= 9$$

area of trapezium $= \frac{1}{2} (9+24) (8)$

$$= 132 \text{ cm}^2_{11}$$

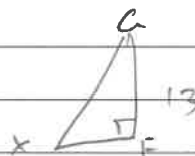
b) $XF = \frac{5}{8} \times 24$

$$= 15$$

$$XG = \sqrt{15^2 + 13^2}$$

$$= 19.849$$

$$= 19.8 \text{ cm}_{11}$$



c) $GB = \sqrt{13^2 + 8^2}$

$$= \sqrt{233}$$

$$XB = \sqrt{8^2 + 15^2}$$

$$= 17$$

$$XB^2 = XG^2 + BG^2 - 2(XG)(BG) \cos \angle XGB$$

$$\angle XGB = \cos^{-1} \left[\frac{17^2 - 233 - 394}{-2(\sqrt{233})(1344)} \right]$$

$$= 56.098^\circ$$

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$$\begin{aligned} \text{area of } \triangle BGx &= \frac{1}{2} (\sqrt{344}) (\sqrt{235}) \sin 56.098^\circ \\ &= 125.74 \\ &= 126 \text{ cm}^2 \text{ (3sf)} \end{aligned}$$

$$\begin{aligned} 89i) \text{ length } PQ &= \sqrt{(-3-2)^2 + (5-11)^2} \\ &= 7.8102 \\ &= 7.81 \text{ units (3sf)} \end{aligned}$$

$$\begin{aligned} ii) \vec{PR} &= \vec{OR} - \vec{OP} \\ \vec{OR} &= \vec{PR} + \vec{OP} \\ &= \begin{pmatrix} 8 \\ -2 \end{pmatrix} + \begin{pmatrix} -3 \\ 5 \end{pmatrix} \\ &= \begin{pmatrix} 5 \\ 3 \end{pmatrix} \end{aligned}$$

$\therefore R$ is $(5, 3)$

$$\begin{aligned} iii) \text{ gradient} &= \frac{11-3}{2-5} \\ &= -\frac{8}{3} \\ &= -2\frac{2}{3} \\ y &= -2\frac{2}{3}x + c \end{aligned}$$

when $x = 2, y = 11$

$$11 = -2\frac{2}{3}(2) + c$$

$$c = 16\frac{1}{3}$$

\therefore equation of QR is $y = -2\frac{2}{3}x + 16\frac{1}{3}$

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$$\begin{aligned}\vec{DC} &= \vec{DO} + \vec{OC} \\ &= -\frac{5}{3}\vec{b} + 3\vec{a} \\ &= 3\vec{a} - \frac{5}{3}\vec{b}\end{aligned}$$

$\angle BOX = \angle DOC$ (Common angle)

$\angle OBX = \angle ODC$ (Corresponding \angle)

$\therefore \triangle OBX$ is similar to $\triangle ODC$ (AA)

$$\frac{BX}{DC} = \frac{OB}{OD}$$

$$= \frac{3}{5}$$

$$\vec{BX} = \frac{3}{5}(3\vec{a} - \frac{5}{3}\vec{b})$$

$$= \frac{9}{5}\vec{a} - \vec{b}$$

$$\vec{XD} = \vec{XB} + \vec{BD}$$

$$= \vec{b} - \frac{9}{5}\vec{a} + \frac{2}{3}\vec{b}$$

$$= \frac{5}{3}\vec{b} - \frac{9}{5}\vec{a}$$

i) $A' = \{1, 4, 6, 8, 9, 10, 12, 14, 15\}$

ii) $(A \cup B)' = \{4, 8, 9, 12, 14\}$

iii) $P(P \notin C) = \frac{4}{9}$

bi) $P(\text{study french and spanish}) = \frac{8}{15}$

ii) $P(\text{both study spanish but not french}) = \frac{12}{20} \times \frac{11}{19}$
 $= \frac{33}{95}$

iii) $P(\text{only one study spanish}) = \frac{10}{30} \times \frac{9}{29} \times \frac{20}{28} \times 3$
 $= \frac{45}{203}$

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10a) time taken to make 1 pair of earrings = $\frac{60 \times 60}{7}$
 $= 514.29$
 $= 510 \text{ sec (nearest 10 sec)}$

b) payment for all items made = $231.75 - 9.8 \times 9$
 $= \$143.55$

no. of bracelets made = $\frac{143.55}{1.45}$

$= 99$

average bracelet per hour = $\frac{99}{9}$

$= 11$, (shown)

c) let the time taken for Chen be x seconds
 time taken by zhen for 1 necklace = $(x - 80)$ sec.

$8 \left(\frac{3600}{x} + \frac{3600}{x-80} \right) = 132$

$3600(x-80) + 3600x = 16.5(x)(x-80)$

$3600x - 288000 + 3600x = 16.5x^2 - 1320x$

$16.5x^2 - 8520x + 288000 = 0$

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

$x = \frac{8520 \pm \sqrt{(-8520)^2 - 4(16.5)(288000)}}{2(16.5)}$

$x = 480$ or $x = 36.364$ (3sf)

$\therefore x = 480$

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$$\begin{aligned} \text{Amount Chen earn daily} &= [8 \times 9.8 + (8) \left(\frac{3600}{480} \right) (1.65)] \\ &= \$177.40 \end{aligned}$$

$$\begin{aligned} \text{Amount Zhi earn daily} &= [8 \times 9.8 + (8) \left(\frac{3600}{480 - 80} \right) (1.65)] \\ &= \$197.20 \end{aligned}$$

$$\begin{aligned} \text{Amount Chen earn annually} &= 177.40 \times 5 \times 48 + 18 \times 8 \times 9.8 \\ &= \$43\,587.20 \end{aligned}$$

$$\begin{aligned} \text{Amount Zhi earn annually} &= 197.20 \times 5 \times 48 + 18 \times 8 \times 9.8 \\ &= \$48\,739.20 \end{aligned}$$

∴ Assuming that they both do not work during the holidays and there are 4 weeks a month, Chen would not be able to earn the advertised minimum annual income but Zhi would.

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