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1) $\sqrt[5]{12.5^2 - \frac{6.8}{0.057}} = -1.9408$
$= -1.94$ (3sf) //

2a) $3y^5 \times 5y^3 = 15y^8$ //

b) $3(2x-1) - 2 = 6x - 3 - 2$
$= 6x - 5$ //

3a) median $= \frac{25+32}{2}$
$= 28.5$ //

b) range $= 40 - 14$
$= 26$ //

4a) 32 //

b) $T_n = 3(n+1) + 5$
$= 3n + 3 + 5$
$= 3n + 8$ //

c) $3n + 8 = 157$
$3n = 149$
$n = 49.667$ (5sf)
Since n is not a whole number, it is not possible to have a diagram with 157 dots //

5a) P(counter is pink) $= 1 - \frac{2}{5} - \frac{2}{15}$
$= \frac{7}{15}$

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b) let number of red counters added be x

$\frac{16}{8+16+x} = \frac{1}{4}$

$\frac{16}{24+x} = \frac{1}{4}$

$24+x = 64$

$x = 40$ //

∴ 40 red counters were added.

6. $4a + 2b = 119$

$2a + b = 59.5$

$b = 59.5 - 2a$ — ①

$5a + 3b = 165$ — ②

sub ① into ②

$5a + 3(59.5 - 2a) = 165$

$5a + 178.5 - 6a = 165$

$-a = -13.5$

$a = 13.5$ //

$b = 59.5 - 2(13.5)$

$= 32.5$ //

Small pot : 13.5kg //

Large pot : 32.5 kg //

7a) interior angle of octagon $= \frac{(8-2)\times 180^\circ}{8}$

$= 135^\circ$

∴ $\angle BCD = 135^\circ$ //

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7b) BC = CD (sides of regular octagon)
BJ = BA (sides of square)
= CB

$\angle CBJ = 135 - 90^\circ$
$= 45^\circ$

$\angle CBJ + \angle BCD = 45^\circ + 135^\circ$
$= 180^\circ$

Since $\angle CBJ$ and $\angle BCD$ add up to 180°, CD // BJ and BC = CD = BJ,
∴ BCDJ is a rhombus.

c) $\angle DJB = \angle BCD$
$= 135^\circ$

$\angle KJD = 360^\circ - 90^\circ - 60^\circ - 135^\circ$
$= 75^\circ$ //

8) $84 = 2^2 \times 3 \times 7$
$60 = 2^2 \times 3 \times 5$
$36 = 2^2 \times 3^2$

2 | 84	2 | 60	2 | 36
2 | 42	2 | 30	2 | 18
3 | 21	3 | 15	3 | 9
7 | 7	5 | 5	3 | 3
1	1	1

HCF $= 2^2 \times 3$
$= 12$

$\frac{84 \times 60 \times 36}{12^3} = 105$

∴ minimum no. of cubes required is 105

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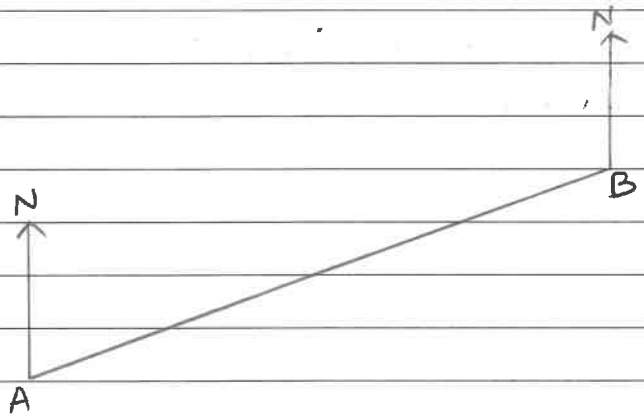
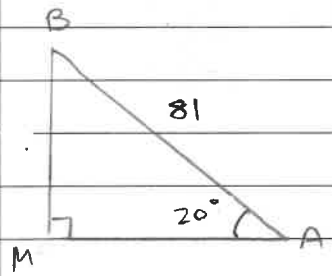
9a)



b)



let M be meeting point.

$\angle ABM = 180° - 90° - 20°$ (sum of $\angle$ in $\triangle$)

$= 70°$

bearing second boat sail on $= 360° - [180° - 60° - 70°]$

$= 360° - 50°$

$= 310°$ //

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10.) area of shaded region $= \pi(23)^2 - \pi(5)^2$

$= 504\pi \text{ cm}^2$

area of large dotted circle $= \frac{2}{3} \times 504\pi + \pi(5)^2$

$= 361\pi \text{ cm}^2$

$\pi r^2 = 361\pi$

$r^2 = 361$

$r = \sqrt{361}$

$= 19$

$\therefore$ radius of large dotted circle $= 19\text{cm}$ //

11a) $30 - 45a = 15(2 - 3a)$

b) $(5x - 4y)^2 = (5x)^2 - 2(5x)(4y) + (4y)^2$

$= 25x^2 - 40xy + 16y^2$ //

12)

TV	Laptop
W : H	W : H
4 : 3	8 : 5
20 : 15	24 : 15

fraction not covered by image $= \frac{24 \times 15 - 20 \times 15}{24 \times 15}$

$= \frac{4}{24}$

$= \frac{1}{6}$ //

13a) time taken $= (t - 10)$ min

b) $18\left(\frac{t}{60}\right) = 24\left(\frac{t-10}{60}\right)$

$18t = 24(t - 10)$

$18t = 24t - 240$

$-6t = -240$

$t = 40$ min //

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14) $2(6x-20)-30 > 1000$

$12x - 40 - 30 > 1000$

$12x > 1070$ //

b) $12x > 1070$

$x > 89\frac{1}{6}$

$\therefore$ Smallest possible value of x is 90 //

15) $AB = DE$ (given)

$\angle ABC = \angle CDE$ (alt $\angle$s, $AB // DE$)

$\angle CAB = \angle CED$ (alt $\angle$s, $AB // DE$)

$\therefore \triangle ABC \equiv \triangle EDC$ (ASA)

$\therefore AC = CE$

Since $AC = CE$, BD bisects AE //

16) $4x^2 + 4x - 15 = (2x-3)(2x+5)$

17) $\angle ROQ = 2 \times 35°$ ($\angle$ at centre = 2 $\angle$ at circumference)

$= 70°$

$\angle OXR = 180° - 70° - 30°$ (sum of $\angle$ in $\triangle$)

$= 80°$

$\angle PXQ = \angle OXR$ (vert opp $\angle$s)

$= 80°$

$\angle OQP = 180° - 80° - 35°$ (sum of $\angle$ in $\triangle$)

$= 65°$ //

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18) $T = \begin{pmatrix} 5 & 10 & 4 & 2 \\ x & x+2 & 2 & 1 \end{pmatrix} \begin{pmatrix} 140 & 150 \\ 105 & 100 \\ 13 & 12 \\ 9 & 8 \end{pmatrix}$

$= \begin{pmatrix} 1820 & 1814 \\ 245x+245 & 250x+232 \end{pmatrix}$

b) The first row of elements of matrix T represents the total cost of tiles that Chong would have to pay if he were to buy from the store and online supplier respectively. //

c) $250x + 232 - (245x + 245) = 2$

$5x - 13 = 2$

$5x = 15$

$x = 3$ //

d) lowest price $= 245(3) + 245$

$= \$980$ //

19) $5\sin x = 2$

$\sin x = \frac{2}{5}$

$x = 23.578$ or $180° - x = 23.578°$

$= 23.6°$ (1dp) // $x = 180° - 23.578°$

$= 156.42°$

$= 156.4°$ (1dp) //

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20) $3a+2c = \frac{5-c}{3b}$

$3b(3a+2c) = 5-c$

$9ab + 6bc = 5-c$

$6bc + c = 5 - 9ab$

$c(6b+1) = 5 - 9ab$

$c = \frac{5-9ab}{6b+1}$

21) $\frac{3}{2x-3} - \frac{2}{3x-2} = \frac{3(3x-2) - 2(2x-3)}{(2x-3)(3x-2)}$

$= \frac{9x-6-4x+6}{(2x-3)(3x-2)}$

$= \frac{5x}{(2x-3)(3x-2)}$ //

22) $\sin \angle DAB = \frac{DB}{AD}$

$\sin 38° = \frac{DB}{12.8}$

$DB = 12.8 \sin 38°$

$\cos \angle CBD = \frac{DB}{CB}$

$\angle CBD = \cos^{-1}\left(\frac{12.8 \sin 38°}{10.3}\right)$

$= 40.085$

$= 40.1°$ (1dp)

23) $25^{2x} = 125^{7}$

$5^{4x} = 5^{21}$

$\therefore 4x = 21$

$x = \frac{21}{4}$

$= 5.25$ //

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24ai) $\text{mean} = \frac{3\times2450 + 5\times2550 + 14\times2650 + 8\times2750}{30}$

$= 2640$

ii) $S.D = \sqrt{\frac{209\,335\,000}{30} - (2640)^2}$ $\quad f(x^2) = 3(2450)^2 + 5(2550)^2 + 14(2650)^2 + 8(2750)^2$

$= 209\,335\,000$

$= 90.738$

$= 90.7$ (3sf)

b) The mean will increase by \$60 and standard deviation remains the same. 4

25a) when $t=0$, $N = m$

when $t=1$, $N = m\times 2^3$

$= 8m$

$8m = 2000$

$m = 250$ //

b) $8^t = 2^{3t}$

when $2^{3t} = k$

$N = 250\times k$

$= 250k$

c) when $t=2$

$N = 250\times 2^6$

$= 16000$

increase $= 16000 - 250$

$= 15750$

% increase $= \frac{15750}{250}\times 100\%$

$= 6300\%$

d) Diagram 3.

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