MATHEMATICS (4048/01) O LEVEL PAPER 1

Thinker EDUCATION MATH SPECIALISTS

Q1. -1.940766019

≈ -1.94 (3sf)

Q2. (a). $3y^5 \times 5y^3$

$= 15y^8$

(b). $3(2x-1)-2$

$= 6x-3-2$

$= 6x-5$

Q3. (a). 14 16 19 25 32 32 32 40

middle position $= \frac{8+1}{2}$

$= 4.5$

median $= \frac{25+32}{2}$

$= 28.5$

(b). Range $= 40-14$

$= 26$

Q4. (a). $14+3+3+3+3$

$= 26$

(b). $3n+2$

(c). $3n+2 = 157$

$3n = 155$

$n = 51\frac{2}{3}$

Since n is not an integer, it is not possible to have a diagram with 157 dots.

Q5. (a). $P(\text{pink}) = 1 - \frac{2}{5} - \frac{2}{15}$

$= \frac{7}{15}$

(b). Let the no. of red counters added be x.

$P(\text{green}) = \frac{16}{8+16+x}$

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

$24 + x = 64$

$x = 64 - 24$

$x = 40$

$\therefore$ 40 red counters

Q6. (a). $4a + 2b = 119$ —— ①

$5a + 3b = 165$ —— ②

① × 3: $3(4a+2b) = 3(119)$

$12a + 6b = 357$

② × 2: $2(5a+3b) = 2(165)$

$10a + 6b = 330$

① − ②:

$(12a+6b) - (10a+6b) = 357 - 330$

$2a = 27$

$a = 13.5$

sub $a = 13.5$ in ①:

$4(13.5) + 2b = 119$

$54 + 2b = 119$

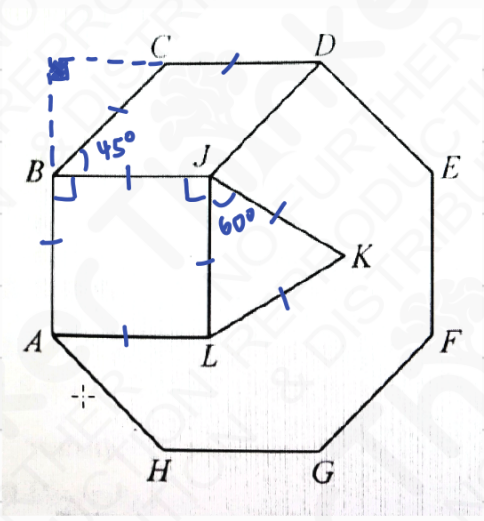
$2b = 65$

$b = 32.5$

$\therefore$ small pot = 13.5 kg

large pot = 32.5 kg

Q7.



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

$= 135^\circ$

(b). $BL = CD$ (sides of a regular octagon)

$BJ = BA$ (sides of a square)

$\therefore BJ = BL = CD = BA$

$BJ \parallel CD$ since CD and BJ are perpendicular to BA.

$\therefore BLDJ$ is a rhombus.

(c). Since $BLDJ$ is a rhombus,

$\angle BLD = \angle BJD = 135^\circ$ (opp angles of a rhombus)

$\angle KJD = 360^\circ - 135^\circ - 90^\circ - 60^\circ$ ($\angle$s at a point)

$= 75^\circ$

Q8. $84 = 2^2 \times 3 \times 7$

$60 = 2^2 \times 3 \times 5$

$36 = 2^2 \times 3^2$

HCF $= 2^2 \times 3$

$= 4 \times 3$

$= 12$

$84 \div 12 = 7$

$60 \div 12 = 5$

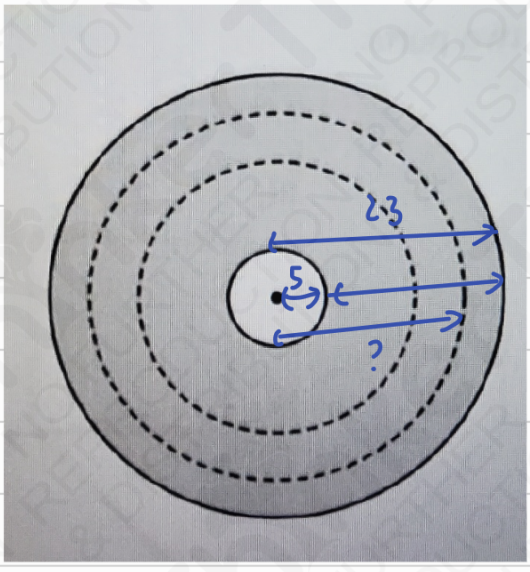
$36 \div 12 = 3$

number of cubes $= 7 \times 5 \times 3$

$= 105$

Q9. geometrical constructions

Q10.



Area of big circle $= \pi(23)^2$

$= 529\pi$

Area of small circle $= \pi(5)^2$

$= 25\pi$

Area of shaded $= 529\pi - 25\pi$

$= 504\pi$

Area of 1 shaded $= 504\pi \div 3$

$= 168\pi$

Let the radius of larger dotted circle be r.

$529\pi - \pi r^2 = 168\pi$

$\pi r^2 = 361\pi$

$r^2 = 361$

$r = \pm\sqrt{361}$

$= 19$ or -19 (rej)

$\therefore$ 19 cm

Q11. (a): $30 - 45a$

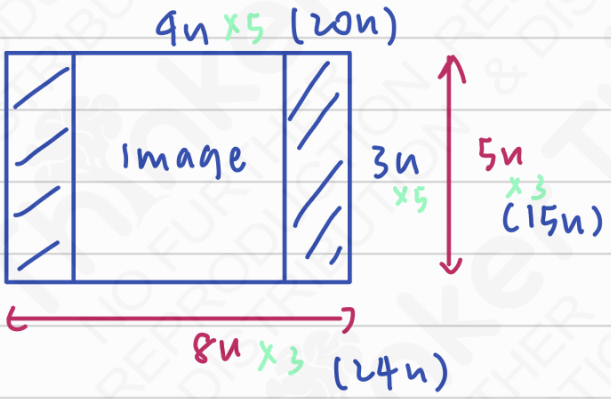
$= 15(2 - 3a)$

(b): $(5x - 4y)^2$

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

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

Q12.



Area of laptop screen $= 24u \times 15u$

$= 360u^2$

Area of image $= 20u \times 15u$

$= 300u^2$

Not covered $= 360u^2 - 300u^2$

$= 60u^2$

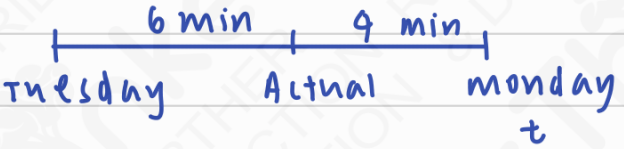
$$\frac{\text{Not covered}}{\text{Laptop}} = \frac{60u^2}{360u^2}$$

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

Q13. (a): time taken on Tuesday: $t - 4 - 6$

$= t - 10$

$\therefore (t - 10)$ minutes



(b). distance travelled on Monday = distance travelled on Tuesday

$$18(t) = 24(t-10)$$
$$18t = 24t - 240$$
$$24t - 18t = 240$$
$$6t = 240$$
$$t = 40$$

∴ 40 minutes

Q14. (a). $2(6x - 20) - 30 > 1000$

(b). $12x - 40 - 30 > 1000$
$12x - 70 > 1000$
$12x > 1070$
$x > 89.1666$

∴ smallest $x = 90$

Q15. $\angle BCA = \angle DCE$ (vert. opp ∠s)
$AB = ED$ (given)
$\angle ABC = \angle EDC$ (alternate angles, $AB \parallel DE$)
By AAS congruency test,
∴ $\triangle ABC$ is congruent to $\triangle EDC$.
∴ $AC = EC$
∴ BD bisects AE at C. (shown)

Q16. $4x^2 + 4x - 15$
$= (2x + 5)(2x - 3)$

Q17. $\angle QOR = 2 \times 35°$ ($\angle$ at centre $= 2 \times \angle$ at circumference)

$= 70°$

$OQ = OR$ (radius of circle)

$\therefore \Delta OQR$ is an isosceles triangle

$\angle OQR = \frac{180° - 70°}{2}$ (isosceles triangle)

$= 55°$

$\angle XRQ = 55° - 30°$

$= 25°$

$\angle OQP = 180° - 35° - 25° - 55°$ ($\angle$ sum of Δ)

$= 65°$

Q18. (a). $T = PQ$

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

$$= \begin{pmatrix} 1820 & 1814 \\ 140x + 105x + 210 + 26 + 9 & 150x + 100x + 200 + 24 + 8 \end{pmatrix}$$

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

(b). The elements of T represents the total cost of materials required by Cheng and Xin from the store and the online supplier respectively.

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

$5x = 15$

$x = 3$

(d). Store price: $245(3) + 245$ $980

$= 980$

Q19. $5\sin x = 2$

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

$x = \sin^{-1}\left(\frac{2}{5}\right)$

$= 23.57817° \approx 23.6° \text{ (1dp)}$

$x = 180 - 23.57817°$

$= 156.421° \approx 156.4° \text{ (1dp)}$

$x = 23.6° \text{ or } 156.4°$

Q20. $3a + 2c = \frac{5-c}{3b}$

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

$9ab + 6bc = 5-c$

$6bc + c = 5 - 9ab$

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

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

Q21. $\frac{3}{2x-3} - \frac{2}{3x-2}$

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

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

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

Q22. $\sin 38° = \frac{BD}{12.8}$

$BD = 12.8 \sin 38°$

$\cos \angle CBD = \frac{BD}{BC}$

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

$= 40.08465°$

$\approx 40.1°$ (1dp)

Q23. $25^{2x} = 125^7$

$5^{4x} = (5^3)^7$

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

$\therefore 4x = 21$

$x = 5\frac{1}{4}$

Q24. (a)(i). $2640

(ii). 90.7377

$\approx$ 90.74 (2dp)

$\therefore$ $90.74

(b). The mean will increase by $60 but the standard deviation will remain the same.

Q25. (a). $N = m \times 2^{3t}$

when $N = 2000$, $t = 1$

$2000 = m \times 2^3$

$8m = 2000$

$m = 250$

(b). when $8^t = k$, $m = 250$

$N = 250 \times 8^t$

$N = 250 \times k$

$N = 250k$

(c). when $t = 0$,

$N = 250 \times 2^0$

$= 250$

when $t = 2$,

$N = 250 \times 2^6$

$= 16000$

% increase $= \frac{16000 - 250}{250} \times 100\%$

$= 6300\%$

(d). Diagram 3