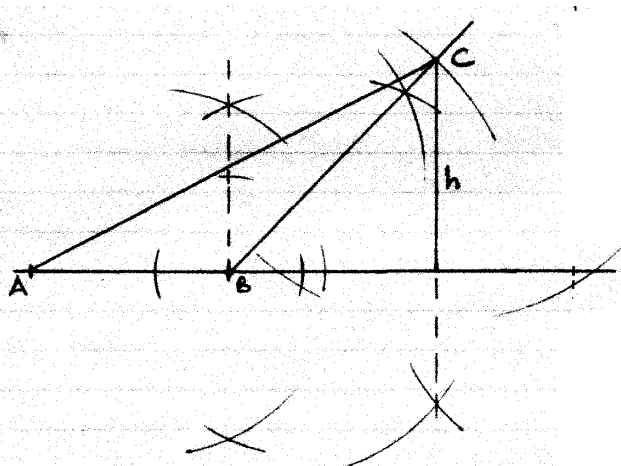


SUNRISE MATHEMATICS MARKING SCHEME 2021

1.	$2 + \frac{40}{60} = 2\frac{2}{3}$ hours $2\frac{2}{3} \times 120 = 320$ km $\frac{320}{4} = 80$ litres $80 \times 59 = 4720$ sh.	B1 M1 A1
		03
2.	$x + 80 = 180 \Rightarrow x = 100$ $180 - 128 = 52$ $52n + 100 = 360$ - - - - - $\quad 52n = 260$ $\quad n = 5$ - - - - - $n = 5 + 1 = 6$ - - - - -	M1 M1 A1
		03
3.	a)  b) $h = 4.2 \pm 0.1$ cm - - - - - $A = \frac{1}{2} \times 4 \times 4.2$ $= 8.4$ cm ² - - - - -	B1 B1 B1 B1

		04
4.	$2x - 2 \leq 3x + 1$ $-2 - 1 \leq 3x - 2x$ $-3 \leq x$ $3x + 1 < x + 11$ $2x < 10$ $x < 5$ $-3 \leq x < 5$ Integral values $-3, -2, -1, 0, 1, 2, 3, 4$	B1 for $-3 \leq x$ B1 for $x < 5$ B1 - All correct integral values
		03
5.	$\sqrt{\frac{1408 \times 594 \times 12}{605 \times 125 \times 100}}$ $\sqrt{\frac{128 \times 54 \times 12}{5 \times 125 \times 100}}$ $\sqrt{\left[\frac{128 \times 9 \times 2 \times 3 \times 3 \times 2}{100 \times 625} \right]}$ $= \frac{72}{625}$	M1 M1 A1
		03
6.	$ASF = \frac{48}{108} = \frac{4}{9}$ $LSF = \sqrt{\frac{4}{9}} = \frac{2}{3}$ $VSF = \left(\frac{2}{3} \right)^3 = \frac{8}{27}$ $Vol = \frac{8}{27} \times 162$ $= 48 \text{ cm}^3$	M1 M1 A1
		03
7.	$0.5 \times 14 \times 8 \sin \theta = 28 \text{ m}^2$ $\sin \theta = 0.5$ $\theta = \sin^{-1}(0.5)$ $\theta = 30^\circ$	M1 A1
		02
8.	Tuesday-Thursday = $24 \times 3 = 72$ hours	B1

	Monday=2400-0445=19hours 15minutes Friday=18hours 45minutes Total time=72+19.25+18.75=110hours Time lost=0.5x110=55minutes 1845hrs-55minutes=1750hours =5.50pm	M1 A1
		03
9.	$N=9t^2-25a^2=(3t-5a)(3t+5a)$ $D=6t^2+19at+15a^2=6t^2+9at+10at+15a^2$ $=3t(2t+3a)+5a(2t+3a)$ $=(3t+5a)(2t+3a)$ $\underline{N=(3t-5a)(3t+5a)}$ $D \quad (3t+5a)(2t+3a)$ $=\frac{3t-5a}{2t+3a}$	M1 M1 A1
		03
10.	$\frac{5}{63.34} - \sqrt[3]{0.0169}$ $= 5\left(\frac{1}{63.34}\right) - \sqrt[3]{16.9 \times 10^{-3}}$ $= 5 \times 0.01579 - 2.566 \times 10^{-1}$ $= -0.17765$	M1 M1 A1
		03
11. (a)	$M = \frac{15,132,000}{75.66}$ $= 200,000 \text{ US Dollars}$	M1 A1
(b)	$\frac{15,132,000}{126.64}$ $11944 \text{ Sterling pounds}$	M1 A1
		04
12.	$\text{Marked price} = \frac{100}{90} \times 7200$ $= sh \ 8 \ 000$	M1 M1

	$\tan 80^\circ = \frac{h}{20 - x}$ $\Rightarrow h = (20 - x)\tan 80^\circ \dots\dots\dots(i)$ $\text{Also } \tan 30^\circ = \frac{h}{20}$ $\Rightarrow h = 20 \tan 30^\circ \dots\dots\dots(ii)$ $\therefore 20 \tan 30^\circ = (20 - x)\tan 80^\circ.$ $11.547 = 113.425 - 5.6711x$ $5.671x = 101.878$ $x = 17.96$ $\cong 18m$	M1 A1
		03
16.	$\sin 4y = \cos 2y$ $4y^\circ + 2y^\circ = 90^\circ$ $6y^\circ = 90^\circ$	
		02
17. (a)	Surface area of hemisphere = $2\pi r^2$ $S.A = 2 \times \pi \times 1.5^2$ 14.14 cm^2 Surface area of cylindrical part $2\pi rh$ $S.A = 2 \times \pi \times r \times h$ $22\pi \times 1.5 \times 6.5 = 61.29 \text{ cm}^2$ $T.S.A = 14.14 + 61.29$ $= 75.43 \text{ cm}^2$	M1 M1 A1 M1
(b)	Volume of hemispherical part = $\frac{2}{3}\pi r^3$ $= \frac{2}{3} \times \pi \times 1.5^3$ $= 7.071 \text{ cm}^3$ Volume of cylindrical part = $\pi r^2 h$ $= \pi \times 1.5^2 \times 6.5$ $= 45.96 \text{ cm}^3$ T. volume = $7.069 + 45.96$ $= 53.04 \text{ cm}^3$	A1 M1 A1
(c)	Density = M/v $= 10/53.04$ $= 0.1886 \text{ g/cm}^3$	M1 A1

		10
18.		
(a)	$\mathbf{AB} = \mathbf{b} - \mathbf{a}$	A1
(i)		
(ii)	$\mathbf{OC} = \frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$	A2
(iii)	$\mathbf{BD} = \frac{1}{2} \mathbf{a} - \mathbf{b}$	A1
(b)	$\mathbf{OX} = \mathbf{b}(1-h) + \frac{1}{2}\mathbf{ah}$	A1
(C)	$\mathbf{OX} = \mathbf{b}(1-h) + \frac{1}{2}\mathbf{ah}$	M1
	$\mathbf{OX} = \frac{1}{4}\mathbf{ak} + \frac{3}{4}\mathbf{bk}$	
	$\frac{1}{2}\mathbf{ah} = \frac{1}{4}\mathbf{ak}$	
	$2\mathbf{h} = \mathbf{k}$	
	$\frac{3}{4}\mathbf{bk} = \mathbf{b}(1-h)$	M1
	$\frac{3}{4}\mathbf{k} = 1 - h$	
	$\frac{3}{4}(2\mathbf{h}) = 1 - h$	M1
	$\frac{5}{2}\mathbf{h} = 1 \Rightarrow \mathbf{h} = \frac{2}{5}$	
	$\mathbf{K} = 2\left(\frac{2}{5}\right) = \frac{4}{5}$	A1
	$\mathbf{K} = \frac{4}{5}$	
(d)	$\frac{1}{5}\mathbf{a} + \frac{3}{5}\mathbf{b}$	A1
		10
19.		
(a)	$\frac{y-3}{x+1} = \frac{1}{2}$	M1
	$y-3 = -\frac{1}{2}x - \frac{1}{2}$	
	$y = -\frac{1}{2}x + \frac{5}{2}$	A1

(b)	$g = \frac{5 - -3}{4 - 1}$ $= \frac{8}{3}$	A1
(c)	$\frac{y-5}{x-4} = \frac{8}{3}$ $y-5 = \frac{8}{3}x - \frac{32}{3}$	M1 A1
(d)	$y = \frac{8}{3}x - \frac{32}{3} + 5$ $y = \frac{8}{3}x - \frac{17}{3}$	M1 M1 A1
(e)	$\frac{y-5}{x} = -\frac{3}{8}$ $y = \frac{-3}{8}x + 5$ $\frac{y-5}{x-4} = -\frac{1}{2}$ $y = -\frac{1}{2}x + 7$	M1 A1
20.	$\frac{1200}{x}$ $\frac{1200}{x} + 10 \dots\dots\dots (i)$ $\frac{1200 + 200}{x - 5} = \frac{1400}{x - 5} \dots\dots\dots (ii)$ $\Rightarrow \frac{1200}{x} + 10 = \frac{1400}{x - 5}$ $x^2 - 25x - 600 = 0$ $x^2 - 40x - 15x - 600 = 0$	B1 M1 M1 M1 M1 M1

	$x(x - 40) + 15(x - 40) = 0$ $x = -15 \quad \text{or} \quad x = 40$ $\Rightarrow \text{No. of people} = 40 - 5 = 35$ $\frac{1400}{35} = \text{Sh } 40.$	M1 M1 A1
		10
21.	Total ratio = $8+14+3=25$ Material $\Rightarrow \frac{8}{25} \times 1250 = 400$ Labour $\Rightarrow \frac{14}{25} \times 1250 = 700$ Transport $\Rightarrow \frac{3}{25} \times 1250 = 150$ 2004 Material $\Rightarrow 400 \times 2 = 800$ Labours $= \frac{130}{100} \times 700 = 910$ Transport $\Rightarrow \frac{120}{100} \times 150 = 180$ Total in 2004 = $(1800 + 910 + 180)$ = Sh 1890 In 2005 increased to 1981 due to labour only $\therefore 800 + \left(\frac{x+100}{100} \times 910 \right) + 180 = 1981$ $\left(\frac{x+100}{100} \right) 91 = 198 - 980$ $x + 100 = \frac{10010}{91} \quad x + 100 = 100$ $x = 10$ %increase = 10%	B1 B1 B1 M1 M1 A1 M1 M1 M1 A1
		10
22.	(a) $a = \frac{v-u}{t}$ $2.75 = \frac{22-0}{t}$ $t = \frac{22}{2.75}$ = 8 sec (b) Distance = $\frac{1}{2} \times 8 \times 22$ = 88m (c) $847 = \frac{1}{2} (40+t) \times 22$ $847 = \frac{1}{2} (72+t) \times 22$ $1694 = (72+t) \times 22$ $\frac{1694}{22} = 72 + t$	M1 M1 A1 M1 A1 M1

$$77 = 72 + t$$

$$T = 5 \text{ sec}$$

$$T = 40 + t = 40 + 5 = 45 \text{ sec.}$$

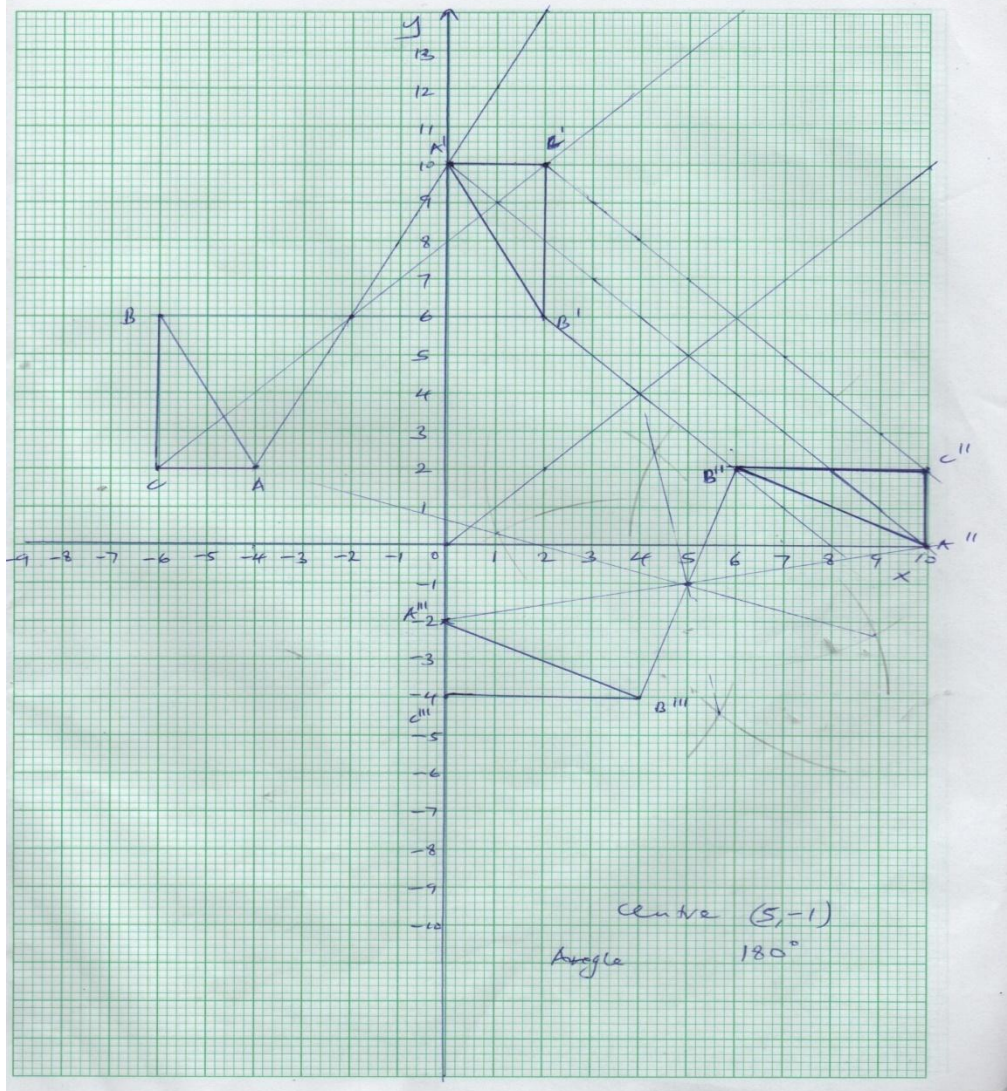
$$(d) a = \frac{v-u}{t} = \frac{0-22}{5}$$

$$= -4.4 \text{ m/s}^2$$

M1
A1

M1
A1
10

23.



$$\left. \begin{array}{l} A'(0,10) \\ B'(2,6) \\ C'(2,10) \end{array} \right\} 3$$

$$\left. \begin{array}{l} A''(10,2) \\ B''(6,2) \\ C''(10,2) \end{array} \right\} 3$$

A1
A1

ABC =2

24.

(a)

Class	Tally	Frequency	CF
20 - 27	///	2	2
28 - 35	//// //	7	9
36 - 43	////	3	12
44 - 51	////	4	16
52 - 59	//// /	6	22
60 - 67	////	3	25

$$\begin{aligned}
 \text{(b) Median} &= L + \left(\frac{\frac{N}{2} - C}{f} \right) i \\
 &= 43.5 + \left(\frac{12.5 - 12}{4} \right) 8 \\
 &= 43.5 + \left(\frac{1}{4} \times 8 \right) \\
 &= 43.5 + 1 \\
 &= 44.5
 \end{aligned}$$

