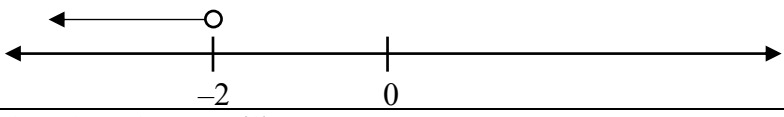


2021 EOY 2E Math Paper 1 Marking Scheme

Qn	Solution	Marks
1a	$180 = 2^2 \times 3^2 \times 5$ $x = 2, y = 1$	
1b	$36 = 2^2 \times 3^2$ HCF = 36	
2	Sleep : Study : Play = 14 : 6 : 3 Time spent studying = $\frac{11.5}{14 + 6 + 3} \times 6$ = 3 hours	
3a	0.961529697 = 0.96 (2sf)	
3b	Cara is <u>not correct</u> , because the <u>degree of accuracy</u> is different / <u>2.50 is more accurate</u> with one <u>more decimal place</u> / 2.50 is <u>3sf</u> while 2.5 is <u>2sf, 2.50 more accurate.</u>	
4a	$(a + b)^2 = a^2 + b^2 + 2ab$ $16 = a^2 + b^2 + 2(-2)$ $a^2 + b^2 = 20$ (shown)	
4b	$(a - b)^2 = a^2 + b^2 - 2ab$ = $20 - 2(-2)$ = 24	
5a	$0.64 \text{ m}^3 = 0.64 \times 100^3 \text{ cm}^3$ = 640 000 cm^3	
5b	$60 \text{ m/s} = \frac{60 \div 1000 \text{ km}}{1 \div 60 \div 60 \text{ h}}$ = 216 km/h	
6a	$AC^2 = 29^2$ = 841 $AB^2 + BC^2 = 20^2 + 21^2$ = 841 = AC^2 By <u>converse of Pythagoras' Theorem</u> , this is a right-angled triangle.	
7a	$4x^2 - 9 = (2x - 3)(2x + 3)$	
7b	$6px + 3qx - 8py - 4qy = 3x(2p + q) - 4y(2p + q)$ = $(3x - 4y)(2p + q)$	B1 o.e. (grouping) A1

8a	$\text{Gradient} = \frac{15}{5}$ $= 3$	
8b	$y\text{-intercept} = 15$ Equation of line AB is $y = 3x + 15$	
8c	$y = 3(-2) + 15$ $= 9$	
9a	$v^2 = (19)^2 + 2(9)(1800)$ $v = \sqrt{32761}$ $= 181$	
9b	$v^2 = u^2 + 2as$ $u^2 = v^2 - 2as$ $u = \pm\sqrt{v^2 - 2as}$	
10a	5, 5, 1, 2, 4, 3	
10b	Mean will be 2 cm less	
11a (i)	$2(2x - 5) \geq 3(x + 3)$ $4x - 10 \geq 3x + 9$ $x \geq 19$	
11a (ii)	19	
11b	$x < -2$ 	
12a	$2x + 3y = 1 \quad \text{-----}(1)$ $\frac{1}{5}x - y = 4 \quad \text{-----}(2)$ <u>Elimination Method</u> $10 \times (2): 2x - 10y = 40 \quad \text{-----}(3)$ Sub (3) to (1): $2(20 + 5y) + 3y = 1$ $40 + 13y = 1$ $13y = -39$ $y = -3$ From (1): $2x + 3(-3) = 1$ $2x = 10$ $x = 5$ <u>Substitution Method</u>	

	From (2): $x = 20 + 5y$ -----(3) (3) – (2): $(2x - 10y) - (2x + 3y) = 40 - 1$ $-13y = 39$ $y = -3$ Sub to (3): $x = 20 + 5(-3)$ $= 5$	
12b	Suggests alternative method, elimination or substitution, to solve (refer to alternative method above) OR Substitute x and y values back into both equations, ensure both equations are satisfied.	
13a	External surface area $= 2\pi(5)^2 + 2\pi(5)(18)$ $= 230\pi \text{ or } 722.566$ $= 723 \text{ cm}^2$	
13b	<u>Method 1 (Volume)</u> Total cups $= \pi(5)^2(18) \div \frac{1}{3}\pi(2.5)^2(9)$ $= 24$ <u>Method 2 (Proportion)</u> Since volume of cone is one third that of a cylinder, and the conical cup has half the radius and height. proportion of cup $= \frac{1}{3} \times \left(\frac{1}{2}\right)^2 \times \frac{1}{2}$ $= \frac{1}{24} \text{ of cylinder}$ Therefore, Ben is correct as it can fill 24 cups.	
14a	<u>Method 1 (Interior angle)</u> $160 \times n = (n - 2) \times 180$ $20n = 360$ $n = 18$ <u>Method 2 (Exterior angle)</u> Each exterior angle $= 180 - 160$ $= 20$ Number of sides $= 360 \div 20$ $= 18$	

14b	Number of sides left = $n - 6$ Sum of exterior angle = 360 $6(30) + (n - 6)(x) = 360$ $(n - 6)(x) = 180$ $x = \frac{180}{n - 6}$	
15a (i)	$V = \frac{k}{P}$ $4 = \frac{k}{150}$ $k = 600$ $V = \frac{600}{P}$	
15a (ii)	$10 = \frac{600}{P}$ $P = 60 \text{ N/m}^3$	
15b (i)	Since distance = speed x time, $n = 1$	
15b (ii)	Since vol = $\frac{2}{3}\pi r^3$ $n = 3$	
16a	Area of trapezium = $\frac{1}{2}[3(3x - 6) + (x - 2)](7.5)$ $187.5 = 3.75(10x - 20)$ $50 = 10x - 20$ $10x = 70$ $x = 7$	
16b	Perimeter = $3(3x - 6) + (x - 2) + 2(2x - 5)$ $= 3(15) + 5 + 2(9)$ $= 68 \text{ cm}$	
16c	$\angle CBE = \angle BEF$ (alternate angles) $= 180^\circ - 125^\circ \text{ (interior angles)}$ $= 55^\circ$	
17a	By Pythagoras' Theorem, $BC = \sqrt{4^2 - 2^2}$ $= \sqrt{12} \text{ or } 3.4641$ $= 3.46 \text{ cm}$	

17b	$\text{Scale factor} = \frac{9.6}{\sqrt{12}}$ $= 2.7712$ $= 2.77$	
17c	$DE = CE - 4$ $= 2.771 \times 4 - 4$ $= 7.08 \text{ cm}$	
18a	$\frac{90}{360} \times 120$ $= 30$	
18b	$\text{Angle (EL)} = \frac{15}{120} \times 360^\circ$ $= 45^\circ$	
18c	7.5 units represents (120 – 30 – 15) students Number of students whose fav. subject is Science $= \frac{75}{7.5} \times 6.5$ $= 65$ OR Angle represented by Science $= \frac{360 - 90 - 45}{7.5} \times 6.5$ $= 195^\circ$ Number of students whose fav. subject is Science $= \frac{195}{360} \times 120$ $= 65$	
18d	Can show the relative size of a part in relation to the whole / Can show proportion compared to the whole	