Qn	Solution	Mark	Remarks
1	-3.2001		
2(a)	$2a^8$		
	9		
2(b)	2+10 <i>x</i>		
3(a)	27.95		Exact value only
3(c)	32.4		
4(a)	37		
4(b)	4n + 1		Accept equivalent form
4(c)	Number of dots, $n = 133$ is a whole number/ positive integer/532 is a multiple of 4		
5(a)	P(yellow) = 0.25		
5(b)	Let the initial number of yellow balls be x. Total number of balls after 10 yellow balls are added = $36+x$ P(yellow) = $\frac{x+10}{26+x} = \frac{1}{3}$ 3x + 30 = 36 + x		
6	x = 3		Mustuso
0	y + x = 11 y = 11 - x (1) 2.1x + 1.35y = 18.6 (2) sub (1) into (2) 2.1x + 1.35(11 - x) = 18.6 number of pens, $x = 5$ number of pencils, $y = 6$		simultaneous eqns to solve.
7(a)	$(7-2)180^{\circ} 900^{\circ}$		
	$\angle FGA = \frac{\sqrt{7}}{7} = \frac{1}{7}$ $\angle OGF = \frac{900^{\circ}}{7} \div 2 = \frac{450^{\circ}}{7}$		Accept 64.3°

7(b)	$\angle EFH = 12\frac{6^{\circ}}{7}$		
	$\angle GFH = \frac{900^{\circ}}{7} - 12\frac{6}{7}^{\circ} = \frac{810^{\circ}}{7}$		
	Then $\angle OGF + \angle GFH = \frac{450^{\circ}}{7} + \frac{810^{\circ}}{7} = 180^{\circ}$		Must work with exact values.
	Given By converse of interior angles,		
	FH and GO are parallel.		
	Given that GF//OH and FH//GO,		
	this implies that Quad EGOH is a parallelogram.		
7(c)	Reflex ∠AOH		
	$=360^{\circ} - \angle GFH - \angle GOA$		
	$810^{\circ}$ 360°		
	$=360^{\circ}-\frac{310}{7}-\frac{300}{7}$		
	$=192.9^{\circ}$		
8	HCF of 60 and 105 = 15		
	Size per group $= 15$		
	No. of groups = $(60+105) \div 15$		
	= 11		
9	Let the length of square be $x \text{ cm}$		Accept any
	Since E is midpoint of BC, $BE = 0.5x$		logical method
	Area of triangle ABE = $(0.5)(0.5x)(x)$ = $0.25x^2$		
	-0.25x Given E is also midpoint of $\Delta E$		
	Therefore area of triangle $BEF = area of triangle ABE$		
	$0.25x^2 = 9$		
	x = 6		
10(a)	Accept Bearing of 164° to 166°		
	Length of $AL = 10$ to $10.1$ cm		
10(b)	Bearing of Sandy's path = 253 ° to 257 °		
11(a)	35(3r-s)		
11(b)	(2x-3)(6x+7)		B1 for each
12(a)	Chocolate - Mint - Toffees		correct factor
12(a)	$2 \ln 2 \ln 2 \ln 2$ $\ln 2 \ln 2 \ln 2$		
	$13 \times 7 \cdot 6n \times 7$		
	52n : 91 : 42n		
	Ratio of chocolates to toffees = $52n : 42n$		
	= 26:21		

12(b)	Total number of sweets = $\frac{273}{21} \times (52n + 91 + 42n)$	
	91 = 282n + 273	
13(a)	$\frac{10v}{3}$	Accept any equivalent expression
13(b)	$\frac{12(\nu+7)}{5}$	Accept any equivalent expression
13(c)	$\frac{12(v+7)}{5} + 4\frac{1}{6} = \frac{10v}{3}$ $\frac{144(v+7)}{60} + \frac{250}{6} = \frac{200v}{60}$ $v = 22.46$ $= 22.5 (3 \text{ s.f.})$	Form equation Correct equation
14(a)	$\frac{(3p-9)}{3} + 2 < 55$	Do not accept any simplified form
14(b)	$\frac{(3p-9)}{3} + 2 < 55$ p-3 < 53 p < 56 p = 53	
15	$(2x+3y)(3y-2x) - (2y-x)^{2} = 9y^{2} - 4x^{2} - (4y^{2} - 4xy + x^{2})$ $= 5y^{2} + 4xy - 5x^{2}$	For $9y^2 - 4x^2$ or $4y^2 - 4xy + x^2$
16	AB = AD  (Given) BC = DC  (Given) AC  is a common length shared by triangle BAC and triangle DAC. Since there are 3 pairs of equal corresponding sides, triangle BAC is congruent to triangle DAC.	
	Alternatively, AB = AD (Given) Since triangle $BAC$ and triangle $DAC$ are isosceles, Angle $ABC$ = angle $DBC$ – angle $DBA$ = angle $BDC$ – angle $BDA$ = angle $ADC$ BC = DC (Given)	
	Since there are 2 pairs of equal corresponding sides, and a pair of equal <u>included</u> angles, triangle <i>BAC</i> is congruent to triangle <i>DAC</i> .	Must see the word included angles.

17	$\angle OBD = \frac{\pi}{2} \ rad \ (radius \ \perp tangent)$	Accept any logical proof
	$\angle OCD = \frac{\pi}{2} rad$ (radius $\perp$ tangent)	reasons given.
	$\angle BOC = 2\pi - \frac{\pi}{2} - \frac{\pi}{2} - x$ (angle sum of quad)	
	$=\pi - x$	
	$\angle BAC = \frac{\pi - x}{2}$ rad (angle at centre = 2× angle at circumference)	
	Since ABDC is a kite, diagonal of kite bisects $\angle BAC$ .	
	Hence, $\angle ABO = \angle BAO$ (Base $\angle s$ of isosceles triangle are equal)	
	$=\frac{\pi-x}{2}\div 2$	
	$=rac{\pi-x}{4}$ rad	
18(a)	$\mathbf{Q} = \begin{pmatrix} 330x + 1675 & 310x + 1710 \\ 3635 & 3380 \end{pmatrix}$	B1 for each correct row
18(b)	Each element of the 2 <sup>nd</sup> row of matrix Q represents Dean's expenditure if he buy from the shop and the online store respectively.	
18(c)	(310x + 1710) - (330x + 1675) = 25	
18(d)	$\frac{x = 0.5}{\text{Amt saved} = \$(3635 - 3380)}$	
	= \$255	
19	$x = 17.5^{\circ} \text{ or } 162.5^{\circ}$	B1 for each answer
20	$\sqrt[3]{6p-5q^3} = \frac{2q}{3}$	
	$6p - 5q^3 = \frac{8q^3}{27}$	
	$162p - 135q^3 = 8q^3$	
	$143q^3 = 162p$	
	$q^3 = \frac{162 p}{143}$	
	$q = \sqrt[3]{\frac{162p}{143}}$	
21(a)	$QS^{2} = 1.4^{2} + 1.3^{2} - 2(1.4)(1.3)\cos 72.6^{\circ}$	
	QS = 1.60047	
	= 1.60	

21(b)	$\sin \angle QPS \ \sin 83.3^{\circ}$				
	1.60047 - 2.0				
	$\angle QPS = 52.633^{\circ}$				
	$\angle PSQ = 180^{\circ} - 52.633^{\circ} - 52.633^{\circ}$				
	$= 44.06^{\circ}$				
	$= 44.1^{\circ}$				
22	Triangle ACJ is similar to	o triangle EFJ			Must show how
	$\frac{AC}{AC} = \frac{FJ}{FJ} = \frac{1}{A}$				to find lengths
	FE CJ 9				
	hence, $CJ = 9 \ cm$ and $J$	$AC = 18 \ cm$			
	$\tan \angle AEH = \frac{9}{18}$				
	$\angle AEH = \tan^{-1}\frac{9}{-1}$				
	18				
	$= 26.56^{\circ}$				
	$= 26.6^{\circ}$				
23	$2^{4x} \times 3^{8x} = 18$				
	$2^{4x} \times (3^2)^{4x} = 18$				
	$(2 \times 3^2)^{4x} = 18$				
	$18^{4x} = 18$				Make the base
	4x = 1				the same and do
	x = 0.25				the indices
24(a)	$GST = 2130.95 = \frac{2130.9}{2130.9}$	95			
	0.051 - 2150.05 - 1.08				
	= \$157.85				
24(b)	Dealer's selling price with	thout GST = $(2130.95 - $ = $(2130.95 - $	157.858)		
	Jen's selling price to dea	$ler = $(1973.101 \div 1.15)$	)		
		= \$1715.74	, 		
25(a)	Men	Distance(km)	Days	_	
	6	10	5	_	
	6	30	90	_	
		50	5		
	No. of extra men hired = $18 - 6$				
	= 12				
	I disagree with Dave as he needs to hire 12 more men instead of 9.				

	Alternatively					
	Men	Distance(km)	Davs			
	6	10	5			
	1	10	30			
	15	30	6			
			<u> </u>			
	I disagree with Da instead of 5 days to Alternatively, Men 6 1 15 15	ve. If he hires 9 more men, o complete. Distance(km) 10 10 150 25	, the job will need 6 days   Days   5   30   30   5			
	I disagree with Da	ve. If he hires 9 more men,	, the distance tarred will be			
25(b)	25 km instead of 30 km.					
$\frac{25(0)}{26(a)}$	All men work at u					
	b) All men work at the same rate. a) $f(-\frac{5}{2},0)$ $(-\frac{1}{2},0)$ $(-\frac{1}{2},0)$ $(0,-5)$ Shape Both coordinates of x-intercepts yintercept					
(b)(i)	Let the height of the height	riangle ABC = h 21				
	hence, x-coordinat	tes of <i>C</i> is 24 or -20			Either 24 or -20	

b(ii)	Length of BD = $\sqrt{(-26-2)^2 + (-16-(-6))^2}$	
	= 29.732	
	= 29.7	