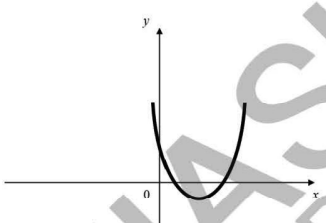
SOLUTIONS FOR SEC 3 EXPRESS 2023 P1 V2

1		$\frac{2.7+\sqrt{2.08}}{(-1.5)^4-0.02^2}=0.82$ [2 SF] [B1]	
2		$35a^4 \div 49\sqrt{a}$ $=\frac{5}{7}a^{\frac{7}{2}}$ [B1]	
3	a	$a-(3d+4a)=a-3d-4a$ $=-3a-3d$ [B1]	
	b	$8am-12ak-6dk+4dm$ $=8am-12ak+4dm-6dk$ $=4a(2m-3k)+2d(2m-3k)$ [M1] $=2(2a+d)(2m-k)$ [A1]	Presence of either one factorization correctly: Extracting common factor [M1] Erroneous working but able to get the final answer [M0A0]
	c	$\frac{2}{c^2-9}-\frac{5}{c+3}$ $=\frac{2}{(c+3)(c-3)}-\frac{5}{c+3}$ $=\frac{2}{(c+3)(c-3)}-\frac{5(c-3)}{(c+3)(c-3)}$ [M1] $=\frac{2-5c+15}{(c+3)(c-3)}$ $=\frac{17-5c}{(c+3)(c-3)}$ [A1]	making common denominator $(c^2-9)(c+3)$ with all correct working on numerator [M1]
4	a	$\frac{1}{4}x-8\le 3-x<9$ $\frac{1}{4}x-8\le 3-x$ or $3-x<9$ $\frac{5}{4}x\le 11$ or $x>-6$ $x\le 8\frac{4}{5}$ or $x>-6$ [either 1 is correct [M1]] Final : $-6<x\le 8\frac{4}{5}$ [A1]	

4	b	$\frac{2x+7}{3}\le b$ $x\le\frac{3b-7}{2}$ $\frac{3b-7}{2}=4$ $b=5$ [B1] $a=-2.5$ [B1]	
5	a	$9.4\times10^{-11}\times2=1.88\times10^{-10}$ [B1]	
	b	$1.06\times10^{-8}\div100=1.06\times10^{-10}$ [M1] Difference $=1.2\times10^{-11}$ [A1]	
6	a	$396=2^2\times3^2\times11$ [B1]	Accept product but not in index form
	b	11 [B1]	
	c	$p=2, q=1$ [B1, B1]	
7	a	2 units rep 32 bars 1 unit rep 16 bars Connie has 16 x 5 = 80 [B1]	
	b	1 unit = 16 bars therefore $(5-w)=1$ [M1] $w=4$ [A1]	Award M1 for presence of 64
8		$\frac{31}{50}\times15+\frac{63}{80}\times15+\frac{43}{50}\times25=42.6125$ [M1] to score at least 75%, the remainder is 32.3875 [M1] $\frac{32.3875}{45}\times100=71.9722$ Hence, she should score 72 marks [A1]	Attempt to find remainder [M1]
9	a	49 [B1]	
	b	12 [B1]	
	c	$n+n^2+(4n-1)$ [M1] $=n^2+5n-1$ [A1]	Presence of n^2 or $(4n-1)$ [M1]
10		Container A : Container B 25 : 10 5 : 2 **125 : 8 [volume ratio]** [M1] Number of containers B needed = $\frac{125}{8}$ [M1] $=15.625$ 16 containers [A1]	Accept volume ratio 15625 : 1000 [M1]
11	a	Length $=\sqrt{(2-3)^2+(3-(-1))^2}$ [M1] $=4.1231$ [A1] ≈ 4.12	

	b	gradient $= \frac{3-(-1)}{2-3} = -4$ [M1] Equation $y-3=-4(x-2)$ $y=-4x+11$ [A1]	
	c	$y=-4x+11$ cuts the x axis: $y=0$ $0=-4x+11$ $x=\frac{11}{4}$ coordinates $=(\frac{11}{4},0)$ [or equivalent] [B1]	
	d	$(0,5)(0,-5)(5,0)(5,-0)(\pm3,4)(\mp3,4)(3,\pm4)(3,\mp4)(-3,-4)$, $(\pm4,3),(\mp4,3),(4,\pm3),(4,\mp3),(-4,-3)$ [B1]	
12	a	x^2-6x+4 $=(x-3)^2$ [B1] -5 [B1]	
	b	 [B1] for correct shape irregardless of coordinates [B1] labelling the y intercept and turning point accurately	Turning point = (3, –5) Y intercept = 4
	c	$x=3$ [B1]	
13	a	$\angle APQ = \frac{(6-2)\times180}{6} = 120$ [B1]	
	b	$\angle SBC = 180-48-48=84$ $\angle ABC = 360-120-84=156$ [M1] $\frac{(n-2)\times180}{n}=156$ [M1] or $n(180-156)=360$ [M1] $180n-360=156n$ $24n=360$ $n=15$ (shown) [A1]	Do not accept if candidates use 15 to show
14	a	$\frac{30}{10}=\frac{v}{8}$ $v=24$ m/s [B1]	Or any appropriate method

	b	*deceleration* $= \frac{30-0}{30} = 1$ m/s² [B1]	
	c	Distance $= \frac{1}{2}(60+20)(30)=1200$ [M1] Ave Speed $= \frac{1200}{60} = 20$ m/s [A1]	