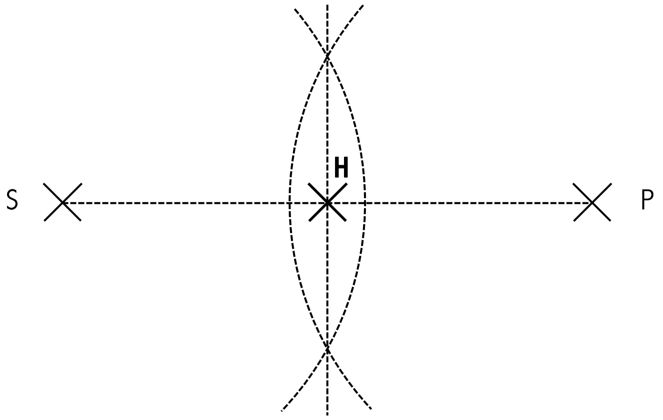
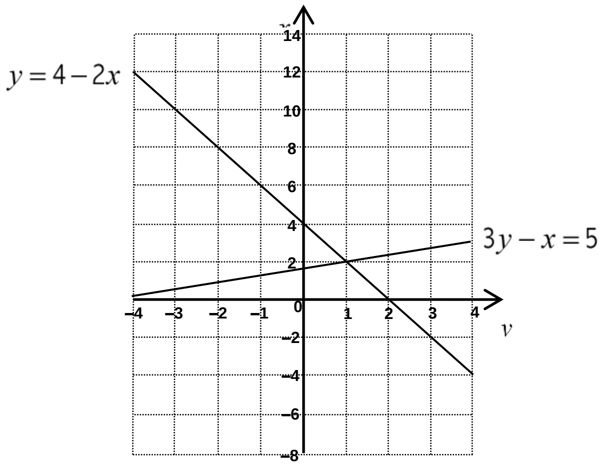
Edexcel Practice GCSE Examination Paper Higher Set 3 Paper 1 Non-Calculator	Solutions

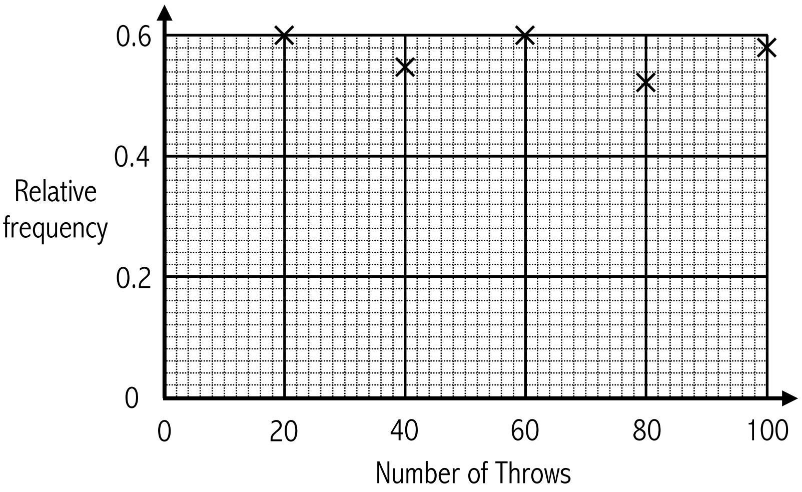
Qu №	Answer	Solutions	Marks		AO	Spec.
1		Factorise $x^2+10x+21$. Find 2 numbers which add to make 10 and multiply to make 21. (7 + 3 = 10); (7 × 3 = 21) So, $x^2+10x+21=(x+7)(x+3)=0$	M1 $(x \pm 7)(x \pm 3)$ M1 $(x+7)(x+3)$		1.3b	A18
	$x=-7$ or $x=-3$	$(x+7)=0$ or $(x+3)=0$ $x=0-7=-7$ or $x=0-3=-3$	A1	**3**		
2		Justine runs x miles a day, so $7x$ miles in 7 days Kate runs x + 3 miles a day, so $7(x+3)=7x+21$ miles in 7 days	M1 setting up expressions		3.1d 1.3b	A21
		Miles run by Justine **and** Kate in 7 days is 63, so $7x+(7x+21)=63$ [simplify] $\rightarrow 14x+21=63$ [−21] $14x=42$ [÷14] $x=3$	M1 setting up equation to find x			
	Justine runs 3 miles Kate runs 6 miles	Justine runs $x=3$ miles in 1 day Kate runs $x+3=3+3=6$ miles in 1 day	A1 both correct answers	**3**		
3		The midpoint between the shop and post office can be found by constructing a perpendicular bisector.  	M1 constructing pair of intersecting arcs with equal radii from points S and P M1 drawing perpendicular lines between S & P and points of arcs A1 correct location of point H (± 1mm)	**3**	2.3b	G2
4	Any correct parallel line	Straight line equations can be written in the form $y=mx+c$ where m is the gradient & c is the y-intercept Two straight lines are parallel if their equations have the same gradient. The gradient of $y=6x+7$ is 6 ∴ a parallel line will also have a gradient of 6 **e.g.** $y=6x+3$ is parallel to $y=6x+7$	A1	**1**	2.1a	A9
5		16 litres of fruit punch required. Fruit juice & lemonade mixed in the ratio 1: 3 16 ÷ (1 + 3) = 16 ÷ 4 = 4	M1		1.3b 3.1d	R5
		Amount of fruit juice required is 1 × 4 = 4 litres Cost of litres of fruit juice is 4 × 1.80 = £7.20	M1			
		Amount of lemonade required is 3 × 4 = 12 litres Cost of 12 litres of white paint is 12 × 0.75 = £9	M1			
	£16.20	Total cost of 16 litres of fruit punch is 7.20 + 9 = £16.20	A1	**4**		

<table>
<tr><th>Qu №</th><th>Answer</th><th>Solutions</th><th>Marks</th><th></th><th>AO</th><th>Spec.</th></tr>
<tr><td>6a</td><td colspan="2">Calculate at least 3 points on the line, e.g.
<table>
<tr><td>x</td><td>–4</td><td>–3</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>$y = 4 - 2x$</td><td>12</td><td>10</td><td>8</td><td>6</td><td>4</td><td>2</td><td>0</td><td>–2</td><td>–4</td></tr>
</table>

</td><td>M1 2 correct points
M1 at least 2 of their points correctly plotted
C1 correct line</td><td></td><td>2.3a
2.3b</td><td>A9</td></tr>
<tr><td>b</td><td>$x = 1, y = 2$</td><td>Solution is where the two lines cross. They cross at (1, 2), so the solution is $x = 1, y = 2$</td><td>C1</td><td>4</td><td>2.3a</td><td>A19</td></tr>
<tr><td>7</td><td>$9 + 4\sqrt{5}$</td><td>$\left(2+\sqrt{5}\right)^2 = \left(2+\sqrt{5}\right)\left(2+\sqrt{5}\right) =$
<table>
<tr><td>×</td><td>2</td><td>$\sqrt{5}$</td></tr>
<tr><td>2</td><td>4</td><td>$2\sqrt{5}$</td></tr>
<tr><td>$\sqrt{5}$</td><td>$2\sqrt{5}$</td><td>5</td></tr>
</table>
$= 4 + 2\sqrt{5} + 2\sqrt{5} + 5$
$= 9 + 4\sqrt{5}$</td><td>M1 expanding brackets
M1 $\sqrt{5} \times \sqrt{5} = 5$
A1</td><td>3</td><td>1.3a</td><td>N8</td></tr>
<tr><td>8</td><td>$y = 1.25$</td><td>y is inversely proportional to x so $y = \frac{k}{x}$
When $x = 2.5, y = 4$ ∴
$4 = \frac{k}{2.5}$ [×2.5]
$k = 10$
∴ $y = \frac{10}{x}$
When $x = 8$, $y = \frac{10}{8}$
$= 1.25$</td><td>M1
M1
A1</td><td>3</td><td>1.3b</td><td>R10
R13</td></tr>
<tr><td>9</td><td>$x = \frac{2y+5}{2y-1}$</td><td>$y = \frac{x+5}{2x-2}$ [multiply by denominator]
$y(2x-2) = x+5$ [expand brackets]
$2xy - 2y = x + 5$ [group x terms on one side]
$2xy - x = 2y + 5$ [factorise by x]
$x(2y-1) = 2y+5$ [÷ $(2y-1)$]
$x = \frac{2y+5}{2y-1}$</td><td>M1
M1
M1 isolate x
A1</td><td>4</td><td>1.3b</td><td>A4
A5</td></tr>
</table>

Qu №	Answer	Solutions	Marks		AO	Spec.
10	**'Show That' Qu** *Working must be shown*	$\frac{3x+2}{4}+\frac{7x-1}{3}$ [find common denominator] $=\frac{3(3x+2)}{12}+\frac{4(7x-1)}{12}$ [expand brackets]	M1		1.3a 2.2	A4 A6
		$=\frac{9x+6}{12}+\frac{28x-4}{12}$ [add fractions] $=\frac{37x+2}{12}$	A1	**2**		
11	**'Show That' Qu** *Working must be shown*	***Working must be shown*** $7x+23+3x+7=180$ [angles on straight lines sum to 180°]	M1		2.4a 1.3b	G3 A17
		$10x+30=180$ [−30] $10x=150$ [÷10] $x=15$	M1			
		$7x+23$ [substitute $x=15$] $(7\times15)+23=128°$	M1			
		$9x-7$ [substitute $x=15$] $(9\times15)-7=128°$ Corresponding angles are equal ∴ AB is parallel to CD.	A1	**4**		
12		$27^{-\frac{2}{3}}=\frac{1}{27^{\frac{2}{3}}}$	M1		1.2 1.3b	N7
		$=\frac{1}{\left(\sqrt[3]{27}\right)^2}$	M1			
	$\frac{1}{9}$	$=\frac{1}{3^2}=\frac{1}{9}$	A1	**3**		
13		$x^2+16x+40$ [complete the square] $=\left(x^2+16x+64\right)-64+40$ [simplify] $=\left(x^2+16x+64\right)-24$ [factorise]	M1		1.3a	A4 A18
	$(x+8)^2-24$ $(p=8,\ q=-24)$	$=(x+8)^2-24$ $(p=8,\ q=-24)$	A1	**2**		
14	8	Mode = 9 ∴ 9 must occur at least twice & more than any other number Median = 7 ∴ 7 is the middle number Mean of 6 ∴ sum of the five integers ÷ 5 = 6 3 of the five integers are 7, 9, 9 The other two are unknown, let them be x and y $\frac{x+y+7+9+9}{5}=6$ [×5] $x+y+25=30$ [−25] $x+y=5$ For greatest possible range, let x = 1 and y = 4 (1 + 4 = 5) Five positive integers that fit the criteria are 1, 4, 7, 9, 9 The range is 9 − 1 = 8	A1 5 positive integers with any 1 of the 3 criteria A1 5 positive integers with at least 2 of the criteria A1 correct range from 5 correct integers	**3**	1.1 1.3a	S4

Qu №	Answer	Solutions	Marks		AO	Spec.
15a	$\sqrt{3}$	$\tan 60° = \sqrt{3}$	B1		1.1	G21
b	$\frac{\sqrt{3}}{2}$	$\sin 120° = \frac{\sqrt{3}}{2}$	B1		1.1	G21
c	$y = \frac{a}{x} + b$	y is inversely proportional to x $y = \frac{a}{x} + b$	B1	3	1.1 2.3a	A12
16		Diameter of one circle $= \frac{18}{3} = 6$ cm Radius $r = \frac{6}{2} = 3$ cm	M1		1.1 1.3b 2.1a	G17
		Area of one circle $= \pi r^2 = 9\pi$ cm^2	M1			
		Shaded area = area of square − 9(area of circle)	M1			
	$(324 - 81\pi)$ cm^2	$= 18^2 - 9(9\pi)$ [simplify] $= (324 - 81\pi)$ cm^2 (or factorised equivalent, e.g. $81(4 - \pi)$ cm^2)	A1	4		
17		Scale factor $= \frac{\text{AB}}{\text{BC}} = \frac{9}{12} = \frac{3}{4}$	M1		1.3b 3.1b	G6 G16 G19
		$\therefore \text{BD} = \text{BC} \div \frac{3}{4} = \text{BC} \times \frac{4}{3}$ [substitute in BC = 12] $= 12 \times \frac{4}{3} = 16$ cm Area of BCD $= \frac{1}{2} \times 12 \times 16$	M1 process to find area			
	96 cm^2	= 96 cm^2	A1	3		
18		B is the mid-point of AC Co-ordinates of A are (17, 12); Co-ordinates of C are (29, 18) The co-ordinates of B are $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{17 + 29}{2}, \frac{12 + 18}{2}\right) = \left(\frac{46}{2}, \frac{30}{2}\right)$ = (23, 15)	M1		3.1a 1.3a	A8 R2
		The coordinates of S are (48, 5) The difference in the x-coordinates of B and S is 48 − 23 = 25 The difference in the y-coordinates of B and S is 5 − 15 = −10	M1			
		TB : BS = 2 : 5 The difference in the x-coordinates of B and T is $25 \times \frac{2}{5} = 10$ The difference in the y-coordinates of B and T is $-10 \times \frac{2}{5} = -4$	M1			
	(13, 19)	The coordinates of T are (23 − 10, 15 − −4) = (13, 19)	A1	4		

Q^{u} №	Answer	Solutions	Marks		AO	Spec.
19		$\frac{4\sqrt{11}}{5+\sqrt{11}}$ [rationalise the denominator] $=\frac{4\sqrt{11}}{5+\sqrt{11}}\times\frac{5-\sqrt{11}}{5-\sqrt{11}}$	M1 rationalising denominator		1.3a	N8
		$=\frac{4\sqrt{11}\left(5-\sqrt{11}\right)}{\left(5+\sqrt{11}\right)\left(5-\sqrt{11}\right)}$ [expand the brackets] $=\frac{20\sqrt{11}-44}{25+5\sqrt{11}-5\sqrt{11}-11}$ [simplify]	M1 $\sqrt{11}\times\sqrt{11}=11$			
	$\frac{10\sqrt{11}-22}{7}$	$=\frac{20\sqrt{11}-44}{14}$ $=\frac{10\sqrt{11}-22}{7}$	A1	**3**		
20	**‘Prove That’ Q$^{\underline{u}}$** *Reasoning must be shown*	***Reasons for each statement must be given*** AE = AE [common side] [side] Angle BAE = angle AED [alternate angles] [angle]	M1		2.2 2.4b	G3 G4 G5
		AB is parallel to DE [properties of a trapezium] ∴ angle ADE = angle ABE [alternate angles] [angle]	M1			
		Triangle ABE is congruent to triangle AED by angle–side–angle (ASA)	A1	**3**		
21	1	Any number to the power of 0 equals 1. $13^0 = 1$	A1	**1**	1.3a	N7
22		Smallest prime that divides into 4800: **2** × 2400 = 4800 Smallest prime that divides into 2400: **2** × 1200 = 2400 Smallest prime that divides into 1200: **2** × 600 = 1200 Smallest prime that divides into 600: **2** × 300 = 600 Smallest prime that divides into 300: **2** × 150 = 300 Smallest prime that divides into 150: **2** × 75 = 150 Smallest prime that divides into 75: **5** × 15 = 75 Smallest prime that divides into 15: **3** × **5** = 15	M1		1.3b	N4
		2 × 2 × 2 × 2 × 2 × 2 × 5 × 3 × 5	M1			
	$2^6 \times 3 \times 5^2$	$= 2^6 \times 3 \times 5^2 = 4800$	A1	**3**		
23a		$(7.2 \times 10^{-6}) \times 300 = (7.2 \times 10^{-6}) \times (3 \times 10^2)$ $= (7.2 \times 3) \times (10^{-6} \times 10^2) = 21.6 \times 10^{-6+2} = 21.6 \times 10^{-4}$	M1		1.3a	N9
	2.16×10^{-3}	In standard form a number between 1 & 10 is multiplied by 10^n 2.16 is between 1 and 10; the decimal moves an extra place to the left $21.6 \times 10^{-4} = 2.16 \times 10^1 \times 10^{-4} = 2.16 \times 10^{1+-4} = 2.16 \times 10^{-3}$	A1			
b		$(1.8 \times 10^7) \div (9 \times 10^3) = (1.8 \div 9) \times (10^7 \div 10^3) = 0.2 \times 10^{7-3} =$ 0.2×10^4	M1		1.3a	N9
	2×10^3	In standard form a number between 1 & 10 is multiplied by 10^n 2 is between 1 and 10; the decimal moves an extra place to the right $0.2 \times 10^4 = 0.2 \times 10^{-1} \times 10^4 = 2 \times 10^{-1+4} = 2 \times 10^3$	A1	**4**		

<table>
<tr><th>Qu №</th><th>Answer</th><th>Solutions</th><th colspan="2">Marks</th><th>AO</th><th>Spec.</th></tr>
<tr><td>24a</td><td colspan="2"><table>
<tr><td>Number of Throws</td><td>20</td><td>40</td><td>60</td><td>80</td><td>100</td></tr>
<tr><td>Number of Tails</td><td>12</td><td>22</td><td>36</td><td>42</td><td>58</td></tr>
<tr><td>Relative Frequency</td><td>0.6</td><td>22 ÷ 40 = 0.55</td><td>0.6</td><td>42 ÷ 80 = 0.525</td><td>0.58</td></tr>
</table></td><td>A1 both correct</td><td></td><td>1.3a</td><td>P1</td></tr>
<tr><td>b</td><td colspan="2">
</td><td>A1 suitable scale
A1 correct plots</td><td></td><td>2.3b</td><td>P1</td></tr>
<tr><td>c</td><td>0.58
[with reason]</td><td><i>Reason must be given</i>
e.g. 0.58 is the best estimate for the probability of throwing a tails because it is calculated from the largest number of throws</td><td>A1</td><td></td><td>2.1b</td><td>P5</td></tr>
<tr><td>d</td><td>No
[with reason]</td><td><i>Reason must be given</i>
e.g. The probability of a fair coin landing on tails is 0.5. 0.58 is larger than 0.5 ∴ the coin is biased</td><td>A1</td><td>5</td><td>3.4b</td><td>P3</td></tr>
<tr><td rowspan="3">25a</td><td rowspan="3">8 green crayons</td><td>Ratio of number of green crayons to purple crayons is 1 : 3
Fraction of crayons which are green is $\frac{1}{1+3}=\frac{1}{4}$
Fraction of crayons which are purple is $\frac{3}{1+3}=\frac{3}{4}$</td><td>M1</td><td></td><td rowspan="3">3.1c
1.3a</td><td rowspan="3">R4
R7</td></tr>
<tr><td>24 purple crayons
$24 \equiv \frac{3}{4}$ of total crayons
Total number of crayons is $24\times\frac{4}{3}=32$
$\frac{1}{4}$ of crayons are green
Number of green crayons is 24 ÷ 3</td><td>M1</td><td></td></tr>
<tr><td>= 8</td><td>A1</td><td></td></tr>
<tr><td rowspan="2">b</td><td rowspan="2">7 green crayons were added</td><td>Ratio of green to purple crayons before more were added was 8 : 24
Ratio of green to purple crayons after more were added was 5 : 8
$8:24=8\times\frac{5}{8}:24\times\frac{5}{8}=5:15$</td><td>M1</td><td></td><td rowspan="2">3.1c
1.3a</td><td rowspan="2">R8</td></tr>
<tr><td>The number of crayons added to the box was 15 − 8 = 7</td><td>A1</td><td>5</td></tr>
<tr><td colspan="7">Total Marks: 80</td></tr>
</table>