Question	Solution	Notes
1. Show that: $5\frac{1}{2} - 2\frac{3}{5} = 2\frac{9}{10}$ (3 marks)	$5\frac{1}{2} - 2\frac{3}{5} = \frac{11}{2} - \frac{13}{5} = \frac{55-26}{10} = \frac{29}{10}$ $\frac{29}{10} = 2\frac{9}{10}$	**M1** For two correct fractions with a common denominator a multiple of 10. **M1** for a complete correct method. **A1** $\frac{29}{10} = 2\frac{9}{10}$ Correct conclusion, correct solution only.
2. $a = 5 \quad b = 4.73 \quad c = \sqrt{7}$ Work out the value of $\frac{b^2-a}{c^2}$. Give your answer to 3 significant figures. (3 marks)	$4.73^2 - 5 = 17.3729$ $\frac{17.3729}{(\sqrt{7})^2} = 2.48184 \approx 2.48$	**M1** $4.73^2 - 5 = 17.3729$ **M1** for dividing by 7 **A1** 2.48 (3sf)
3. Micah wants to borrow £5000 from a bank. She has two options: **Option 1:** A loan with 5% simple interest per year for 5 years. **Option 2:** A loan with 4% compound interest per year, compounded annually, for 5 years. Which loan will cost Micah less in total and by how much? Give your answer to the nearest pound. (6 marks)	**Option 1**: Simple Interest: $5000 \times 0.05 \times 5 = £1250$ Total to be repaid = £6250 **Option 2:** Compound Interest $5000(1 + 0.04)^5 = 6083.264512$ Option 2 will cost Micah less and is cheaper by $6250 - 6082.26 = 167.74 \approx £168$	**M1** – Use of Simple Interest formula. **A1** £6250 **M1** Use of Compoud Interest formula **A1** 6083.26 **M1** f.t. – Finding the difference between their answers. **E1** – Option 2 is cheaper by £168.
4. The perimeter of a triangle is 105 cm. The lengths of the sides of the triangle are in the ratio 4: 5: 6.	$\frac{6}{15} \times 105 = 42cm$	**M1** sight of 15 **M1** $\frac{6}{15} \times 105$ **A1** 42 cm

Work out the length of the longest side of the triangle. (3 marks)		
5. (a) Find the highest common factor of 72 and 90. **(3 marks)** **(b)** Find the lowest common multiple of 72 and 90. **(2 marks)**	$72 = 2^3 \times 3^2$ $90 = 2 \times 3^2 \times 5$ (a) HCF = $2 \times 3^2 = 18$ (b) LCM = $18 \times 2 \times 2 \times 5 = 360$	**B1** $72 = 2^3 \times 3^2$ **or** $90 = 2 \times 3^2 \times 5$ **M1** HCF = 2×3^2 **A1** 18 **M1** $18 \times 2 \times 2 \times 5$ **A1** 360
6. Consider the following sequences: **A**: $1, 4, 9, 16, 25, \ldots$, **B**: $2, 7, 16, 29, 46 \ldots$, **C**: $3, 6, 12, 24, 48 \ldots$, **D**: $1, 4, 7, 10, 13, \ldots$, **E**: $2, 9, 28, 65, 126, \ldots$ Now match each letter with the **nth Term** of the respective sequence. One of them has been done for you. **(3 marks)**	$3\boldsymbol{n} - 2$: **D** $3.2^{\boldsymbol{n-1}}$: **C** $\boldsymbol{n}^3 + 1$: **E** $2\boldsymbol{n}^2 - \boldsymbol{n} + 1$: **B** $\boldsymbol{n}^2$: **A**	**One mark for each correct (up to 3 marks here)** **B1** $3\boldsymbol{n} - 2$: **D** **or** **B1** $\boldsymbol{n}^3 + 1$: **E** **or** **B1** $2\boldsymbol{n}^2 - \boldsymbol{n} + 1$: **B** **or** **B1** $\boldsymbol{n}^2$: **A**
7. **(a)** Write 6.2×10^4 as an ordinary number. **(1 mark)** **(b)** Write 0.000027 in standard form. **(1 mark)** **(c)** Work out the value of $(8.4 \times 10^{12}) \div (4.2 \times 10^4)$. Give your answer in standard form. **(2 marks)**	(a) $6.2 \times 10^4 = \boldsymbol{6200}$ (b) $0.000027 = \boldsymbol{2.7 \times 10^{-5}}$ (c) $\frac{8.4 \times 10^{12}}{4.2 \times 10^4}$ = $\boldsymbol{2.0 \times 10^2}$	**B1** $\boldsymbol{6200}$ **B1** $\boldsymbol{2.7 \times 10^{-5}}$ **M1** evidence of division **A1** $\boldsymbol{2.0 \times 10^2}$
8. A bag contains only purple pencils, green pencils, yellow pencils and red pencils. The table gives the probabilities that, when a pencil is taken	$1 - (0.27 + 0.13) = 0.6$ $0.6 \times 60 = 36$	**(a) M1** - $1 - (0.27 + 0.13) = 0.6$ **M1** - $0.6 \times 60 = 36$ **A1** 9 red pencils

<table>
<tr>
<td>at random from the bag, the pencil will be purple or the pencil will be green.
<table>
<tr><th>Pencil</th><th>Probability</th></tr>
<tr><td>purple</td><td>0.27</td></tr>
<tr><td>green</td><td>0.13</td></tr>
<tr><td>yellow</td><td></td></tr>
<tr><td>red</td><td></td></tr>
</table>

The ratio
number of yellow pencils : number of red pencils = $3:1$

There are 60 pencils in the bag.
(a) Work out the number of red pencils in the bag.
(b) Complete the table.
(5 marks)</td>
<td>$\frac{1}{4} \times 36 = 9$ red pencils in the bag.

$\frac{9}{60} = 0.15$ or $\frac{1}{4} \times 0.6 = 0.15$ (probability of choosing a red pencil)

$1 - (0.27 + 0.13 + 0.15) = 0.45$ probability of choosing a yellow pencil)</td>
<td>(b) B1 0.15 (probability of choosing a red pencil)

B1 0.45 probability of choosing a yellow pencil)</td>
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<tr>
<td>9. (a) Factorise the following:
(i) $4x + 20y$ (1 mark)
(ii) $x^2 + 5x + 6$ (2 marks)
(iii) $9x^2 - 16$ (2 marks)

(b) Solve by Factorising:
$3x^2 + 7x + 2 = 0$ (3 marks)

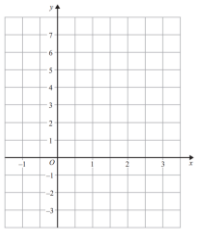
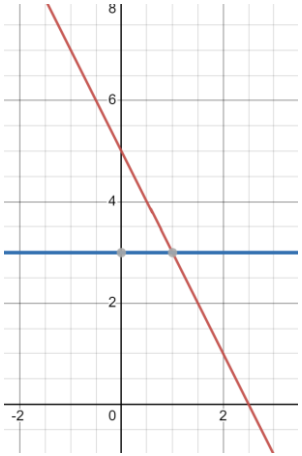
(c) Solve by using the quadratic formula. Give your answers to 2 decimal places.
$5x^2 + 2x - 1 = 0$ (3 marks)</td>
<td>(a)(i) $4x + 20y = 4(x + 5y)$
(ii) $x^2 + 5x + 6 = (x + 2)(x + 3)$
(iii) $9x^2 - 16 = (3x - 4)(3x + 4)$

(b) $3x^2 + 7x + 2 = (3x + 1)(x + 2)$
$(3x + 1)(x + 2) = 0$
$x = \frac{-1}{3}, -2.$

(c) $a = 5, b = 2, c = -1.$
Correctly using the quadratic formula to get:
$-0.68990, 0.28990$
$= = -0.69, 0.29.$</td>
<td>(a) (i) B1 $4(x + 5y)$
(ii) M1 Attempt at 2 brackets $(x + \cdots)(x + \cdots)$
A1 $(x + 2)(x + 3)$
(iii) M1 for sight of $3x$ or sight of 4
A1 $(3x - 4)(3x + 4)$

(b) M1 attempt at factoring $(3x + \cdots)(x + \cdots)$
A1 $(3x + 1)(x + 2)$
A1 both $x = \frac{-1}{3}, -2.$

(c) B1 all 3 correct
$a = 5, b = 2, c = -1.$</td>
</tr>
</table>

		M1 – Correct substitution into the quadratic formula. **A1**- Both correct $-0.69, 0.29$.
10. (a) On the grid, draw the graph of $y = 5 - 2x$ for values of x, from -1 to 3. (3marks)  **(b)** Write down the coordinates of the point where the graph of $y = 5 - 2x$ crosses the line $y = 3$. (1 mark)	(a) $(-1,7), (0,5), (1,3), (2,1), (3,-1)$  (b) $(1,3)$	(a) **B1** for any correct point. **B1** for two or more correct points and no incorrect ones. **M1** for a straight line through the correct points. (b) **B1** $(1,3)$
11. Solve the following simultaneous equations: $$3x + 2y = 12$$ $$2x - y = 3$$ (5 marks)	Multiply Equation 2 by 2. $$2x - 2y = 6$$ Using Elimination, Add Equation 1 and 2 to get: $$7x = 18$$ $$x = \frac{18}{7}$$ From Equation 2, $y = 2x - 3 = 2\left(\frac{18}{7}\right) - 3 = \frac{15}{7}$ So $(\frac{18}{7}, \frac{15}{7})$	**M1** Multiplying Eq. 2 by 2 (or any other correct method) **M1** Eliminating one of the variables **M1** Algebraic Manipulation leading to $x = \cdots$ or $y = \cdots$ **A1** $x = \frac{18}{7}$ **A1** $y = \frac{15}{7}$

12 (a) The number 49 is rounded to 2 significant figures.

(i) Write down the lower bound of 49. **(1 mark)**

(ii) Write down the upper bound of 49. **(1 mark)**

(b) Correct to 2 significant figures, $w = 49$, $x = 27$ and $y = 16$.
Calculate the upper bound of

$$\frac{w}{x-y}$$

(4 marks)

(a) (i) 48.5
(ii) 49.5

(b)

	LB	UB
w	48.5	49.5
x	26.5	27.5
y	15.5	16.5

$$\frac{w}{x-y} = \frac{49.5}{26.5-16.5} = 4.95$$

(a) (i) **B1** 48.5
(ii) **B1** 49.5

(b)
B1 – for sight of any of these:

26.5	27.5
15.5	16.5

M1 for $26.5 - 16.5$
B1 for use of 49.5
A1 for 4.95

13. (a) Simplify the following
(i) y^0 (1 mark)

(ii) $\frac{y^2.y^5}{y^3}$ (1 mark)
(iii) $\left(\frac{1}{(2y)^2}\right)^{-2}$ (3 marks)

(b) Solve for x

$$3^{x+2} = 9^{x-1}$$

(4 marks)

(a) **(i)** $y^0 = 1$
(ii) $\frac{y^2.y^5}{y^3} = \frac{y^7}{y^3} = y^4$

(iii) $\left(\frac{1}{(2y)^2}\right)^{-2} = ((2y)^2)^2 = (4y^2)^2 = 16y^4$

(b)

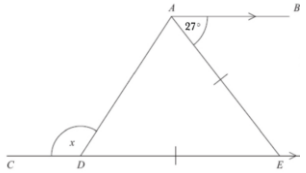
$$3^{x+2} = 9^{x-1}$$
$$3^{x+2} = (3^2)^{x-1}$$
$$x + 2 = 2x - 2$$
$$x = 4$$

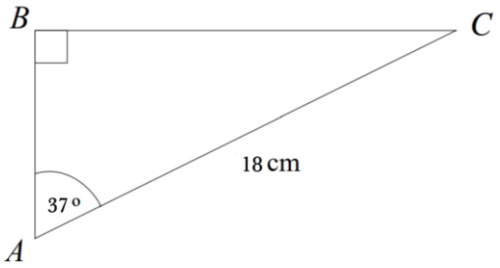
(a) **(i)** $y^0 = 1$ **B1**

(ii) **B1** for y^7
B1 for y^4

(iii) **B1** for $4y^2$
B1 for 16
B1 for y^4

(b) **B1** for $9 = 3^2$
M1 for equating powers
A1 $x + 2 = 2x - 2$
A1 $x = 4$

14. CDE is a straight line. AB is parallel to CE. $DE = AE$.  (a) Write down the value of the angle AED (1 mark) (b) Work out angle ADC, the angle marked x. (2 marks)	(a) $27°$ (b) $(180 - 27) \div 2 = 76.5$	(a) **B1** $27°$ (b) **M1** $(180 - 27) \div 2$ **A1** 76.5
15. Triangle ABC is a right-angled triangle.	(a) $Cos\ 37° = \frac{AB}{18}$ $AB = 18 \times Cos\ 37 = 14.3754 \approx 14.4$ (b) $Sin\ 37° = \frac{BC}{18}$ $AB = 18 \times Sin\ 37 = 10.83267 \approx 10.8$	(a) M1 Use of Cosine A1 14.4 (b) M1 Use of Sine A1 10.8 Accept use of Pythagoras $\sqrt{18^2 - 14.3754^2}$ =10.8327…

 (a) Find the length of AB. Give your answer to 1 decimal place. **(2 marks)** (b) Find the length of BC. Give your answer to 1 decimal place. (**2 marks)**		