I will comment on communication in orange or in orange boxes

TMA 01 abs247

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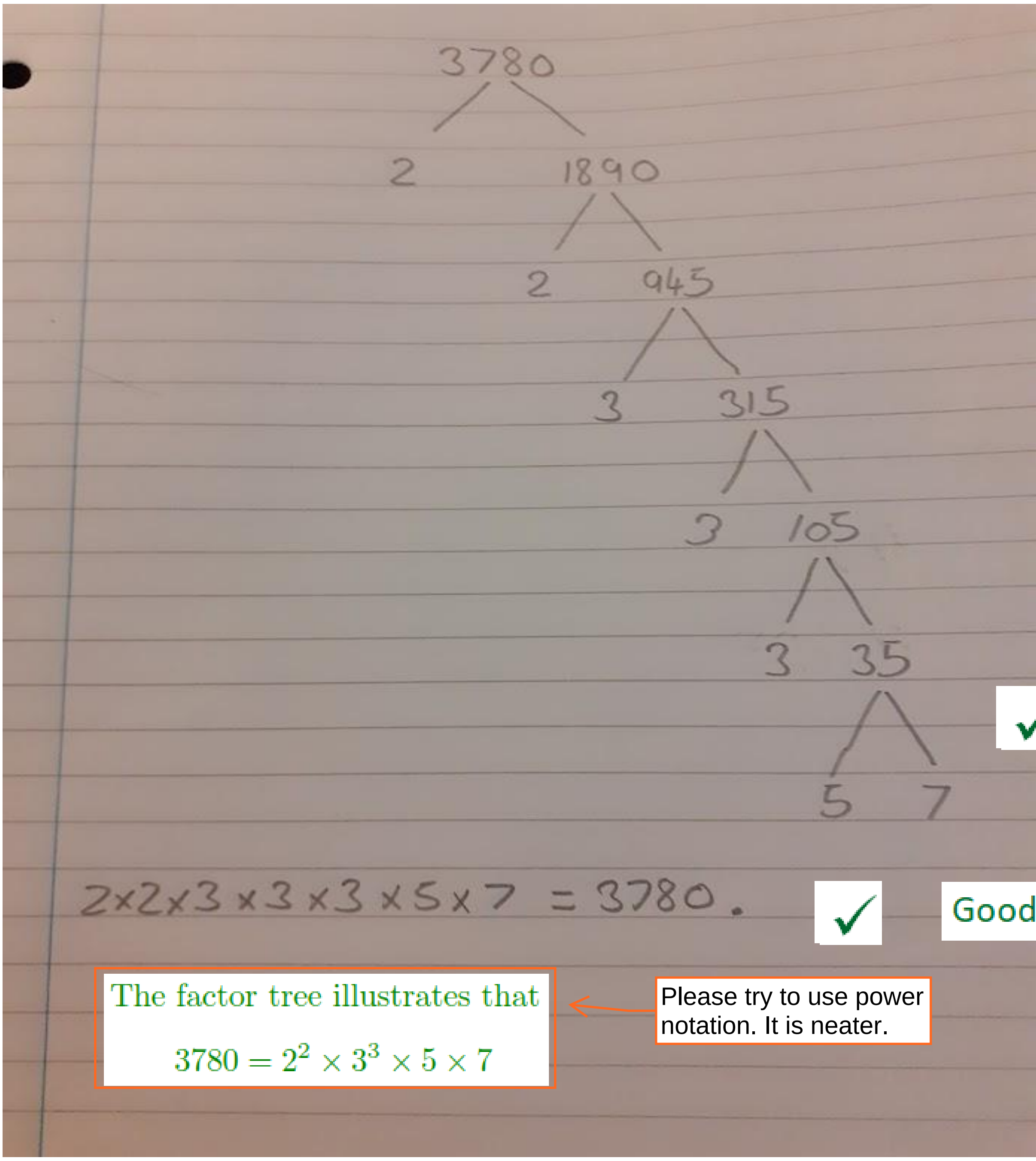
Question 1

(a) (i) Factor Tree for 3780



$\frac{4}{4}$

Question 1

(a) (i) Blank Page for Comments.

(ii) Calculate

$$\frac{3}{4} - \frac{1}{9} + \frac{7}{12}$$

LCD of 4, 9, 12 = 36.

Equals signs are for linking two equal quantities or expressions.
What is on the left of this equals sign? You have misused it.

$$\boxed{=} \frac{3 \times 9}{36} - \frac{1 \times 4}{36} + \frac{7 \times 3}{36}$$

$$= \frac{27}{36} - \frac{4}{36} + \frac{21}{36}$$

$$= \frac{27 - 4 + 21}{36} = \frac{44}{36}$$

$$= \frac{11}{9}$$

✓ Very good

$\frac{4}{4}$

A well-communicated answer:

$$\frac{3}{4} - \frac{1}{9} + \frac{7}{12} = \frac{27}{36} - \frac{4}{36} + \frac{21}{36} = \frac{44}{36} = \frac{11}{9}$$

(ii) Blank Page for Comments.

(iii) Simplify the surd

Surds.

Simplify the Surd.

$$\frac{5\sqrt{8}}{\sqrt{40}} + \sqrt{45}$$

$$= \frac{5\sqrt{2^3}}{\sqrt{2^3 \times 5}} + \sqrt{3^2 \times 5}$$

This is not equal to the last thing you wrote on the line above, so you've misused the equals sign.

$$= 5\sqrt{2^3} \times 1\sqrt{2^3 \times 5} = 40\sqrt{5}$$

$$= 1\sqrt{2^3 \times 5} \times 1\sqrt{2^3 \times 5} = 40$$

This is not equal to the last thing you wrote on the line above

$$= 40\sqrt{5} \div 40 = \sqrt{5}$$

This is not equal to the last thing you wrote on the line above

$$= \sqrt{5} + \sqrt{45} = 4\sqrt{5}$$

And this is not equal to the last thing you wrote on the line above

$$= 4\sqrt{5}$$ ✓

$\frac{2}{3}$

You answer is correct, but I'm not sure how you got there. I think you might be multiplying the numerator and denominator of the fraction by the denominator, but that isn't how you've written the calculation and you've said that all of these lines are equal to each other, which they are not. (-1 mark for unclear method)

A well-communicated answer:

$$\frac{5\sqrt{8}}{\sqrt{40}} + \sqrt{45} = \frac{\sqrt{5} \times \sqrt{5} \times \sqrt{8}}{\sqrt{5} \times \sqrt{8}} + \sqrt{9 \times 5}$$

$$= \sqrt{5} + \sqrt{9} \times \sqrt{5}$$

$$= \sqrt{5} + 3\sqrt{5}$$

$$= 4\sqrt{5}$$

(iii) Blank Page for Comments.

(b)

(i)

-1 mark for omitting this

Number of students to take test = 390

Number of students absent = 30

The required ratio is 390 : 30.

The highest Common factor (HCF) of both 390 and 30 is 30.

HCF: 390 and 30 = 30.

Number of students to take test ÷ Number of students absent
= 390 ÷ 30 = 13.

Number of students absent ÷ Number of students absent
= 30 ÷ 30 = 1

is

The ratio $\boxed{=}$ 13:1 ✓ Good

$\frac{2}{3}$

(b) (i) Blank Page for Comments.

(ii)

390 Students take a test and the grade(s) to ratio is ~~A=~~5 : ~~b=~~13 : ~~c=~~9 : ~~d=~~3.

$5 \div 30 \times 390 = 65$
$13 \div 30 \times 390 = 169$
$9 \div 30 \times 390 = 117$
$3 \div 30 \times 390 = 39$

First, you need to explain where you got 30 from. (-1 mark).

These are all unexplained sums. You must start every calculation with WHAT you are finding a value for.

65 students achieved A grade. ✓

169 students achieved B grade. ✓

117 Students achieved C grade. ✓

39 students achieved D grade. ✓

$\frac{2}{4}$

$65 + 169 + 117 + 39 = 390.$

Again, this is just an unexplained sum. You were asked to ***explain*** how you could check that your answers are plausible. This is not an explanation. (-1 mark)

A well-written solution would be:

Total number of parts in ratio $= 5 + 13 + 9 + 3 = 30$

Number obtaining Grade A $= 5 \times \frac{390}{30} = 65$

Number obtaining Grade B $= 13 \times \frac{390}{30} = 169$

Number obtaining Grade C $= 9 \times \frac{390}{30} = 117$

Number obtaining Grade D $= 3 \times \frac{390}{30} = 39$

We can check these results are correct by adding them up, and they should come to the total number of students taking the test. So,

Total of our results $= 65 + 169 + 117 + 39 = 390$, so our results are plausible.

[See Unit 3, p. 162, Example 17, Activity 39]

(ii) Blank Page for comments.

(c)

(i)

Total Match Time = 8 hours 59 minutes.

Prize Money = $2 130 000.

But this is NOT the total match time. This is the number of minutes in 8 hours.

Number of minutes in 8 hours =

~~Total Match Time in minutes~~ = 8 x 60 = 480 ~~(480~~ min)

Total match time = 480 min + 59 min = 539 minutes.

THIS is the total match time.

Time played for each dollar = Total Match Time in minutes ÷ Prize Money

= 539 ~~min~~ ÷ 2130 000

~~Min_Prize~~ = 0.000253052 ...

This is not an exact number. This is just the number of digits your calculator can display. You need '...'

What is "min_prize"? This is not a computing module. Explain what this is in words.

Min_Prize ~~to three Significant Figures in Ordinary Notation~~ = 0.000253 minutes (to 3 s.f.) ✓

Min_Prize ~~to three Significant Figures in Scientific Notation~~ = 2.53052 * 10^{-4}

= 2.53 * 10^{-4} minutes (to 3 s.f.) ✓

4/4 Good

Look over this answer carefully. Where have you mentioned what this represents? What about Naomi Osaka? Where is she mentioned?

Why is this so small? I can't see what symbol you have used. It should be the same size as your previous characters and should be a multiplication sign

This is good, but your communication needs a bit of attention.
This is a practical problem, so must be written in the context of the problem you are solving. Try reading it without looking at the question paper.
You must start every calculation with WHAT you are finding a value for (and make sure that it really is what you are finding a value for).
If decimal digits fill your calculator display then it is likely that the calculator has rounded the number to fit the display. Assume this is the case and finish with '...'.
Do not write abbreviations or variable names that you might use if you were programming. Write in English sentences. If you do use variable names, you must define them first (so it is a bit pointless in this case).
The accuracy of rounded numbers must be stated in brackets AFTER the number.
Don't forget the units of measurement in your final answer.
Write a conclusion!

See next page for well-written answer.

(c) (i) Blank Page for Comments.

A well-communicated solution:

(i) Naomi Osaka earned \$2,130,000 in 8 hours 59 minutes so

Time taken in minutes $= 8 \times 60 + 59 = 539$

So, Number of minutes played per dollar $= \frac{539}{2130000} = 0.00025305 \ldots$ minutes

$= 0.000253$ minutes (to 3 s.f.)

$= 2.53 \times 10^{-4}$ minutes (to 3 s.f.)

Thus, Naomi played for 0.000253 minutes (to 3 s.f.) or 2.53×10^{-4} minutes (to 3 s.f.) for each dollar she won.

[Note the use of '…' to show that a number is not exact. If you don't use this, you are misusing the equals sign]

Best to avoid $\div$ for division. Divisions are best written in fraction format, e.g. $\frac{539}{2130000} = 0.00025305 \ldots$ minutes

(ii)

Match Time = 8 hours 59 minutes.

Prize Money = \$2130000

Total hours = 59 minutes ÷ 60

= 0.983

This isn't the total number of hours played, and you have stopped writing digits after 3 d.p., so you have misused the equals sign.

Total time played = 8 ~~(hours)~~ + 0.983 ...

= 8.983 ...

Do not use "/" for division

Amount earned per hour = Prize Money / Total hours

= 2130000 ÷ 8.983 ...

= 237114.5497 ...

This is not correct. You have incurred a rounding error by using a rounded value in the calculation.

~~Ordinary notation to three significant figures~~

\$237000 (to 3 s.f.)

So, WHAT does this value represent?

✓

$\frac{2}{3}$

~~Scientific notation to three significant figures~~

\$2.37 * 10⁵

And what does this number represent?

✓

-1 mark for using a rounded value in the calculation.

A well-communicated (and correct) answer:

(ii) Time that Naomi played $= 8 + \frac{59}{60} = 8.983 \ldots$ hours

We know she won \$2,130,000.

So, the amount Naomi won per hour = $\frac{2130000}{8.983\ldots} = \$237105.7 \ldots$

$= \$237000$ (to 3 s.f.)

$= \$2.37 \times 10^5$ (to 3 s.f.)

Thus, Naomi won £237000 per hour (to 3 s.f.) or £2.37×10^5 per hour (to 3 s.f.).

[Note the use of '…' to show the number is not exact.

Remember to use full calculator accuracy in all calculations]

Total for Question 1: $\frac{20}{25}$

(ii) Blank Page for Comments.

Question 2

(a) (i)

(ii)

(a)

(i)

Foremost a clear question would be: if I were to conduct twenty tests which set of results would be faster?

I would therefore categorize the dataset example as an comparing investigation. Moreover, we are comparing one set of results to another. ✓

$\frac{2}{2}$

(ii)

I would categorize the data as Primary Data because the data is new and has been collected by the researcher. ✓ Good

$\frac{2}{2}$

(a) (i) (ii)

Blank Page for Comments.

(b)

(i)

The three features I would be looking for when scanning a dataset is:

?

- Missing Data:
  This could be values within the dataset (NAN).

  Outliers
- Presence of Outliners:
  This would be a value within the dataset that shows an abnormity in size (too large or small).

  abnormality

3
—
3

- Spurious Precision:
  This would be data (usually formatted data) which is different from other values in the dataset.

Very good

(b) (i) Blank Page for Comments.

(b)
(ii)

(b)
(ii)
The 9th row of the table shows an abnormal high value within the Industry Standard column; but a more resonable value in the 'In-house' column.
This result would indicate an error within the Industry Standard Column.

$\frac{1}{3}$

I agree that 648 minutes does seem rather high.
What about the minimum value of the Industry Standard dataset? Is that reasonable?
And what about the maximum and minimum values of the InHouse dataset? Are they reasonable? (-2 marks)

(b) (ii) Blank Page for comments.

(c)

	Number of minutes to complete the test	
	Industry standard	In-house
Minimum (Min)	296	303
Lower quartile (Q1)	338.5	319.5
Median	364.5	338.5 328.5 Careful!
Upper quartile (Q3)	381.5	338.5
Maximum (Max)	648	347
Mean	370.1	328.45
Standard deviation	69.8	12
Interquartile range (IQR)	43	19
Range	352	44
Size of dataset (n)	20	20

$\frac{4}{4}$

✓

(c) Blank Page for Comments.

(d) (i) (ii)

(d)

(i)

The two measures of location from the table in Part (c) are mean and Median.

I would choose the Industry Standard of the dataset to determine the higher location as the Mean is higher.

3/4

It is not a matter of choice. The Industry Standard dataset has both a higher mean AND a higher median than the Inhouse dataset. Therefore, the Industry Standard dataset has the higher location. (-1 mark)

(ii)

The three measures of spread from the table are Range, Interquartile Range and the Standard deviation. The Industry Standard Software has the wider spread.

		Industry	In-house
~~Example:~~ Range	>	352	44
Interquartile	>	43	19
Standard Deviation	>	69.8	12

3/4

Just listing the values is not an explanation. You already wrote down the values in part (c). Now you need to compare them.
I agree that the Industry Standard dataset has a wider spread, but you need to explain that this is because all three measures of spread are greater for the Industry Standard dataset than they are for the Inhouse dataset. (-1 mark)

(d) (i) (ii) Blank Page for comments.

(e) (i)

(e)

(i)

The researchers' conclusion that the 'In-house Software' runs faster is based on slight margins of difference (the mean of the Industry Standard minus the In-house Software is 49.7250). This difference is not really consided to be significant to the overall speed of the Software.

$\frac{0}{2}$

You haven't actually said if you think that the conclusion is reasonable or not, which is what you were asked.

Actually, this is a reasonable conclusion. Both measures of location are higher for the Industry Standard data than for the Inhouse data, so this would support the researcher's conclusion.

[See Unit 4, p.236, Activity 22 and p.248]

(e) (i) Blank Page for Comments.

(ii)

(e)

(ii)

The stage of the statistical Investigation cycle that was used in question (e) (i) was 'Stage 4: Interpret the results'. The researcher had analysed the data and conluded (interpreted) the results.

2/2

Good

(ii) Blank Page for Comments.

(f) outlier

An outliner in a dataset will have an influence on the mean (less so the median), the mean will increase in value because the outliner was smaller than the original value. If the value is amended the median will increase only slightly but the mean will increase by more.

$\frac{1}{2}$

(f) Blank for comments.

You are right that the mean will be much larger with the outlier included, but this is because the outlier is significantly larger than the correct value, and not because it is smaller. The reason for this is that the mean is calculated by adding all the values and then dividing by the number of values. Adding in a very large number will increase the sum and, therefore, increase the mean.
The median is slightly increased by including the outlier. This is because the outlier is above the median value and the correct value is below the median value.
[Unit 4, p. 236 - 237]

What do you mean by 'outcome'?

(g)

If the corrected mean and median results were to be implemented into the new dataset the outcome would only be slightly more increased. I would not foresee any real changes in results.

$\frac{1}{2}$

But what about the conclusion? Would that be the same? You need to point out that the measures of location are still higher for the Industry Standard data, which means that the researcher would still draw the same conclusion.

(g) Blank for Comments.

Total for Question 2: $\frac{21}{30}$

Question 3

(i)

Simplify the expression

$9y - 12 - 4y + 37$

Add -4 to 9

$= 5 \quad (5y - 12 + 37)$

Add 37 to -12 =

$= 25 \quad (5y + 25)$

Answer: $5y + 25$

(i) Blank Page for Comments.

Question 3

(ii)

Solve the equation

$\frac{4}{9}(t+6)=28$

= Multiply 28 by 9

$=4(t+6)=28\times 9$

$=4(t+6)=252$

= Divide each term by 4

$=\frac{(4(t+6)}{4}\ \frac{(252)}{4}$

$=63$

= Add -6 to 63

$=57$

$=t=57$

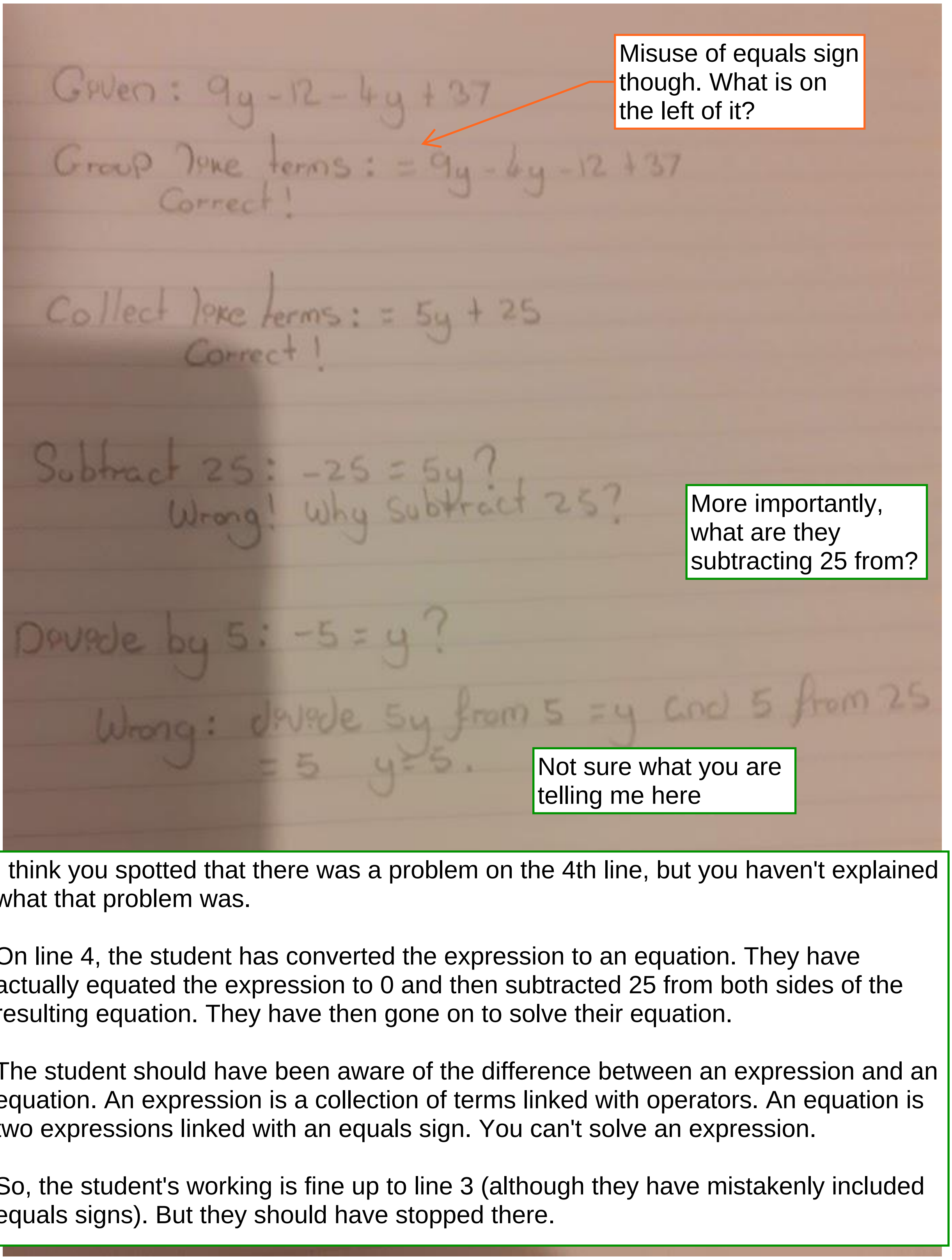
$\frac{4}{9}(57+6)=28$

(ii) Blank Page for Comments.

Question 3

(a)

(i)



Misuse of equals sign though. What is on the left of it?

More importantly, what are they subtracting 25 from?

Not sure what you are telling me here

I think you spotted that there was a problem on the 4th line, but you haven't explained what that problem was.

On line 4, the student has converted the expression to an equation. They have actually equated the expression to 0 and then subtracted 25 from both sides of the resulting equation. They have then gone on to solve their equation.

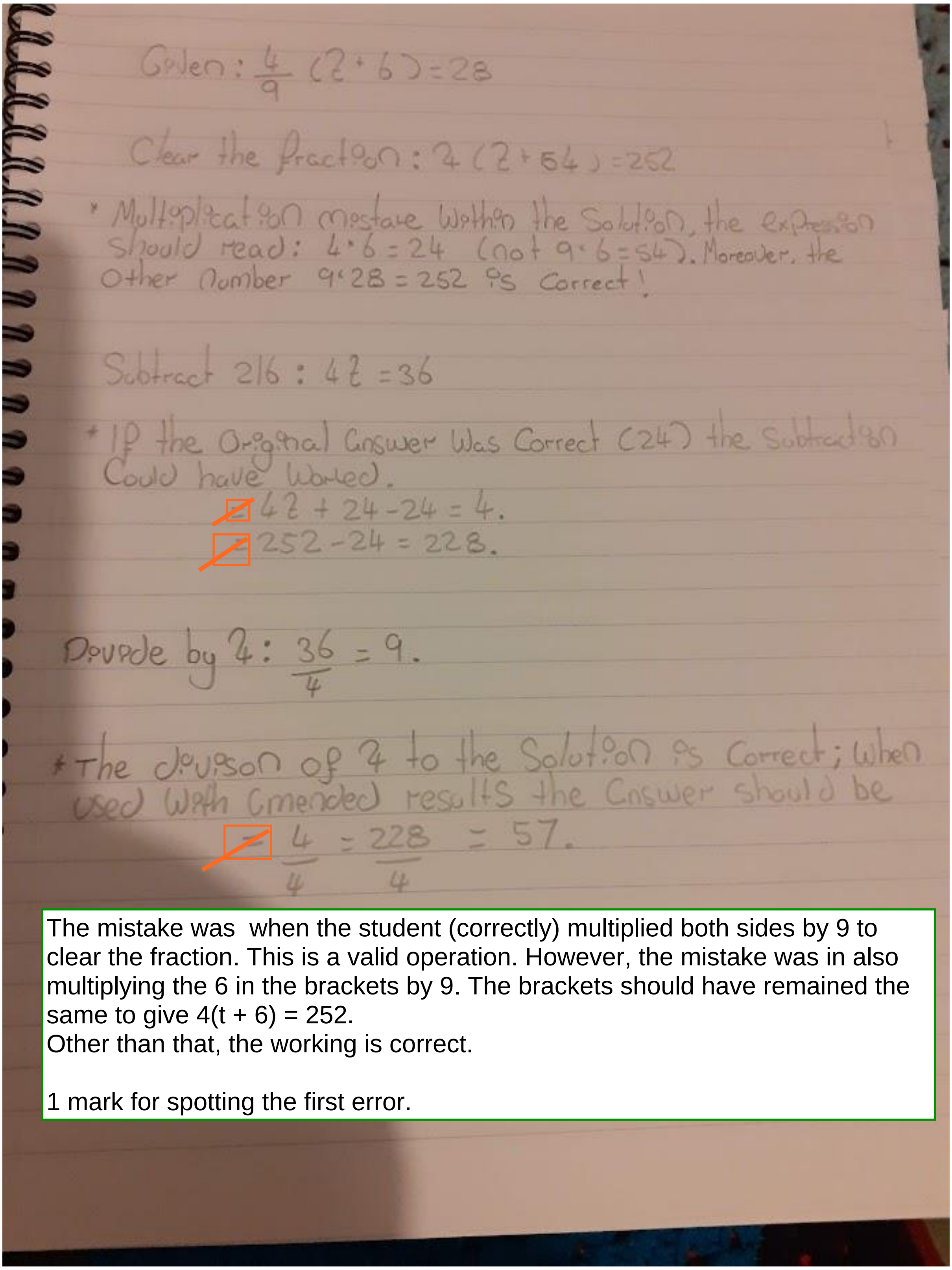
The student should have been aware of the difference between an expression and an equation. An expression is a collection of terms linked with operators. An equation is two expressions linked with an equals sign. You can't solve an expression.

So, the student's working is fine up to line 3 (although they have mistakenly included equals signs). But they should have stopped there.

(a) (i) Blank Page for Comments.

(a)

(ii)



Given: $\frac{4}{9}(t+6)=28$

Clear the fraction: $4(t+54)=252$

* Multiplication mistake within the solution, the expression should read: $4 \cdot 6 = 24$ (not $9 \cdot 6 = 54$). Moreover, the other number $9 \cdot 28 = 252$ is correct!

Subtract 216: $4t = 36$

* If the original answer was correct (24) the subtraction could have worked.

$\cancel{=} 4t + 24 - 24 = 4.$

$\cancel{=} 252 - 24 = 228.$

Divide by 4: $\frac{36}{4} = 9.$

* The division of 4 to the solution is correct; when used with amended results the answer should be

$\cancel{=} \frac{4}{4} = \frac{228}{4} = 57.$

The mistake was when the student (correctly) multiplied both sides by 9 to clear the fraction. This is a valid operation. However, the mistake was in also multiplying the 6 in the brackets by 9. The brackets should have remained the same to give 4(t + 6) = 252.
Other than that, the working is correct.

1 mark for spotting the first error.

$\frac{1}{4}$

(a) (ii) Blank Page for Comments.

(b)

Rearrange the Order

misuse of equals sign

$= 9y - 4y - 12 + 37$

Your result is correct, but the communication is not good and some of your working is incorrect. You should not split the expression up to deal with parts separately. Also, you need to be careful with the equals sign. Equals signs are for linking two equal expressions or quantities, even if they are on separate lines. So, you can't start a train of working with an equals sign and you must make sure that expressions either side of an equals sign really are equal.

Add the like terms together

$= 9 + -4 = 5$

$= 5y$

Add the Numbers -12 and 37 together.

$= -12 + 37 = 25$

$\boxed{=}\ 5y + 25$

This equals sign is saying that this expression is equal to the last thing you wrote on the line above. But this expression is NOT equal to 25

Divide each term by 5

$= \boxed{\frac{5y}{5} = \frac{25}{5}} \quad = \boxed{y + 5 = 5y + 5}$

But y + 5 cannot be equal to 5y + 5

$\frac{1}{2}$

You've said that all expressions on the last line are equal to each other. But none of them are equal.

1 mark for answer, but no marks for method. See Comment 1.

These two expressions are not equal to each other, and I'm not sure why you are dividing by 5

(b)

$\frac{4}{9}(t+6) = 28$

Multiply 28 by 9

$= 28 * 9 = 252$

Multiply 4 by 6

$= 4 * 6 = 24$

$= 4t + 24 = 252$

Subtract 24 from both terms

$4t + 24 - 24 = 4$

$252 - 24 = 228$

Divide the number 4 with both terms

$= \frac{4t}{4} = \frac{228}{4}$ $= t = 57$ ✓

You must deal with an equation as one item, as you need to make sure you always do the same thing to BOTH sides. If you split it up into separate sides, there is a danger that you will forget to treat the sides the same. Think of it like a pair of scales. You can't just decide to cut the scales in half and do things to each side separately. You must keep the scales as one item and keep them balanced.

This is correct, but could be better communicated. See Comment 2

$\frac{4}{4}$

(b) Blank Page for Comments.

Comment 1

Note that I have provided a ***train*** of working leading from the given expression through to the final answer.

The expression is $9y - 12 - 4y + 37$

We reorder the expression by grouping like terms, then we simplify by collecting terms.

So,

$$\begin{aligned} 9y - 12 - 4y + 37 &= 9y - 4y - 12 + 37 \\ &= 5y + 25 \end{aligned}$$

[See Unit 5, p.16 – 17, Example 2, Activities 12 and 13]

Comment 2

My solution would be:

The equation is:	$\frac{4}{9}(t+6) = 28$
Multiply both sides by 9:	$4(t+6) = 252$
Multiply out brackets:	$4t + 24 = 252$
Subtract 24 from both sides:	$4t = 228$
Divide both sides by 4:	$t = 57$

Check: When $t = 57$

$$LHS = \frac{4}{9}(t+6) = \frac{4}{9}(57+6) = \frac{4}{9} \times 63 = 7 \times 4 = 28$$

$RHS = 28$

Since $LHS = RHS$, the solution $t = 57$ is correct

(c)

(1)

The first value within the brackets is not correct, which means the final result does not equal 28. Moreover, the result value states 252 ÷ 9 = 6.7 to 2 sf - which is not correct.

I think you may have missed the point. The reason that the approach is incorrect is that the student has substituted the value into both sides at the same time. This has resulted in them stating that "$\frac{60}{9} = 28$". This is a misuse of the equals sign as it is a mathematical untruth. They should have calculated each side separately, then compared them and reached a conclusion.

$\frac{0}{2}$ See Unit 5, p.42, Example 19 and Activity 37

(2)

My Solution to check for t.

Check 57 for t : $\frac{4}{9}(57+6)=28$

Work out the brackets : $\frac{4}{9}(63)=28$

$\frac{0}{3}$ Giving : $\frac{252}{9}=28$ ✗

You have substituted into both sides of the equation at the same time, which is incorrect. At best, if the solution is correct, you end up with "28 = 28", which is rather silly (a tautology). At worst, if the solution is not correct, you end up with a false statement like " 1 = 2".
Note that you were supposed to check the student's result, not yours.

The correct check

Check: When $t = 9$

$$LHS = \frac{4}{9}(t+6) = \frac{4}{9}(9+6) = \frac{4}{9} \times 15 = \frac{60}{9} = \frac{20}{3}$$

$RHS = 28$

Since $LHS \neq RHS$, the solution $t = 9$ is not correct.

A mistake has been made somewhere.

Total for Question 3: $\frac{6}{15}$

(c) Blank Page for Comments.

Question 4

(a)

In part (a), you are being asked to simplify expressions. You need to start with the given expression and link equal expressions with equals signs, ending with the answer. You need to write a train of working, leading to the answer. I will paste in ideal solutions.

(i)

No. You are not being asked to solve equations in part (a). You are being asked to simplify expressions.

Solve the equation.

$8(7-6t)$

Rearrange the order

$= 8(-6t+7)$

Multiply each number in the brackets by 8

$= 8 \times -6 = -48$

$= 8 \times 7 = 56$

$= -48t + 56$

You have said that all of these things are equal to each other. But they are not.

✓

$\frac{2}{2}$

Ideal solution:

$$8(7-6t) = 8 \times 7 + 8 \times (-6t)$$
$$= 56 - 48t$$

(a) (i) Blank Page for Comments.

(ii)

Solve the equation.

$11 + M(15 - 7M) - 15M$

= Rearrange the Order inside the brackets

$= (-7M + 15)$

Multiply each Number in the brackets

$= M * -7M = 7M^2$

$\boxed{= 15 * 15 = 0}$

But 15 x 15 is not equal to 0. I'm not sure what you mean. (-1 mark for this)

$= 11 - 7M^2$

Rearrange the terms

$= -7M^2 + 11$

$\frac{2}{3}$

Ideal solution:

$$\begin{aligned} 11 + m(15 - 7m) - 15m &= 11 + m \times 15 + m \times (-7m) - 15m \\ &= 11 + 15m - 7m^2 - 15m \\ &= 11 + 15m - 15m - 7m^2 \\ &= 11 - 7m^2 \end{aligned}$$

(ii) Blank Page for Comments.

(iii)

Solve the equation.

16t -8(7s -5t)

Rearrange the order in the brackets

= (-5t 7s)

Multiply 8 by the numbers inside the brackets

= 8*5 = 40t

8*7 = 56s

Because 16t and 40t are alone add them together

= 16 + 40 = 56t

There are no terms in t on the left-hand side of this working, but t makes an appearance on the right-hand side. So, these expressions cannot be equal.

Rearrange the answer:

= -56s + 56t ✓

3/3

A well-written solution:

$$\begin{aligned} 16t - 8(7s - 5t) &= 16t - 8 \times 7s - 8 \times (-5t) \\ &= 16t - 56s + 40t \\ &= 16t + 40t - 56s \\ &= 56t - 56s \end{aligned}$$

(iii) Blank Page for Comments.

(iv)

~~Solve the equation.~~

$8p(7 + 9p^2) - 4(8p - 6 + 3p^3)$

Rearrange the Order

$= (9p^2 + 7) - 4(3p^3 + 8p - 6)$

Multiply 8 by the numbers in the first brackets

$8 \times 9 = 72$
$8 \times 7 = 56$

Multiply −4 by the numbers in the Second brackets

$-4 \times 3 = -12$
$-4 \times 8 = -32$
$-4 \times 6 = -24$

$= (72p^3 + 56p)\ (-12p^3 - 32p - 24)$

The numbers $72p^3$ and $-12p^3$ are alike add them together.

$= 72p^3 + -12p^3 = 60p^3$

$= 60p^3 + 56p - 32p + 24$

56p and −32p are alike add them together.

$56 + -32 = 24$

$= 60p^3 + 24p + 24$ ✓ Good

$\frac{4}{4}$

(iv) Blank Page for Comments.

An ideal solution:

$$8p(7+9p^2)-4(8p-6+3p^3)$$

$$= 8p \times 7 + 8p \times 9p^2 - 4 \times 8p - 4 \times (-6) - 4 \times 3p^3$$

$$= 56p + 72p^3 - 32p + 24 - 12p^3$$

$$= 72p^3 - 12p^3 + 56p - 32p + 24$$

$$= 60p^3 + 24p + 24$$

(v)

$$\frac{4x^2+36x-28}{4x}$$

The GCF of the numbers 4, 36, 28 is 4.

Factor tree of 36 and 28.

36 → 2, 18 → 2, 9

−28 → 2, −14 → 2, −7

$$= \frac{4(x^2+9x-7)}{4x}$$

Remove the factor of 4 from the expression.

$$= \frac{x^2+9x-7}{x}$$

$\frac{0}{4}$

You need to expand the fraction first and then cancel common factors.

$$\frac{4x^2+36x-28}{4x} = \frac{4x^2}{4x} + \frac{36x}{4x} - \frac{28}{4x}$$

$$= \frac{4 \times x \times x}{4 \times x} + \frac{9 \times 4 \times x}{4 \times x} - \frac{7 \times 4}{4 \times x}$$

$$= x + 9 - \frac{7}{x}$$

You can divide numerator and denominator by the factors in red.

[See Unit 5, p. 31 – 32, Example 15 and Activity 30]

(v) Blank Page for Comments.

(a) ← (b)

In part (b), you ARE given equations to solve. Note the equals sign in the equations in this part. There were no equals signs in the expressions you were given in part (a)

(i)

$18a - 16 = 8 + 12a$

Rearrange the Order

$\cancel{=}\ 18a - 16 = -12a + 8$

You must not start an equation with an equals sign

18a and -12a are alike add them together.

$\cancel{=}\ 18 + -12 = 6$

$\cancel{=}\ 6a = 16 + 8$

Do not split the equation up. Keep it as a whole equation and make sure you do the same thing to both sides to keep it balanced.

Add 8 to 16

$16 + 8 = 24$

$\cancel{=}\ 6a = 24$

Divide each number by 6

$$\frac{6a}{6} = \frac{24}{6}$$

$\cancel{=}\ a = \frac{24}{6}$

$\cancel{=}\ a = 4.$ ✓

O.K. so far. Now you need to include a check, in the correct format.
(-1 mark)
See p. 42, Unit 5

$\frac{3}{4}$

See next page for ideal solution, with check in correct format.

(b) (i) Blank Page for Comments.

Better layout:

The equation is: $18a - 16 = 8 + 12a$

Subtract $12a$ from both sides: $6a - 16 = 8$

Add 16 to both sides: $6a = 24$

Divide both sides by 6: $a = 4$

Check

When $a = 4$

$LHS = 18a - 16 = 18 \times 4 - 16 = 72 - 16 = 56$

$RHS = 8 + 12a = 8 + 12 \times 4 = 8 + 48 = 56$

Since LHS = RHS, the solution $a = 4$ is correct.

[See Unit 5, p.41 - 42, Example 18 and notes below it]

(b)

(ii)

$\frac{y}{4} - 5 = 3(y - 9)$

Multiply 3 by each term in brackets

$3 \times y = 3y$

$3 \times -9 = -27$

$\cancel{=}\ \frac{y}{4} - 5 = 3y - 27$

Multiply -3y by 4

$\cancel{=}\ -\frac{12y}{4} + \frac{y}{4} - 5 = -27$

$\cancel{=}\ \frac{-12y + y = 11y}{4} - 5 = -27$

Subtract 5 from -27

$\cancel{=}\ -22$

$\frac{11y}{4} = -22$

Multiply -22 by 4 = -88

$-11y = -88$

(ii)

Cont'

Divide each term by -11

$$\frac{-11y}{-11} = \frac{-88}{-11}$$

$$\cancel{=}\ y = \frac{-88}{-11}$$

$-88 \div -11$

$= 8$

$y = 8$ ✓ Very good

$\frac{4}{5}$

-1 mark for no check
See next page for better layout and check

Total for Question 4: $\frac{18}{25}$

(ii) Blank Page for Comments.

A well-communicated solution, with check:

The equation is: $\frac{y}{4} - 5 = 3(y - 9)$

Multiply both sides by 4: $4\left(\frac{y}{4} - 5\right) = 4 \times 3(y - 9)$

Multiply out brackets: $y - 20 = 12y - 108$

Add 108 to both sides: $y + 88 = 12y$

Subtract y from both sides: $88 = 11y$

Divide both sides by 11: $y = 8$

Check

When $y = 8$

$$LHS = \frac{y}{4} - 5 = \frac{8}{4} - 5 = 2 - 5 = -3$$

$$RHS = 3(y - 9) = 3(8 - 9) = 3 \times (-1) = -1$$

Since LHS = RHS, the solution $y = 8$ is correct.

[See Unit 5, pages 52 - 53, Example 24, Activity 42]

Question 5 – Good Mathematical Communication: $\frac{2}{5}$

Your communication shows promise in this TMA. You've mostly used correct mathematical notation throughout and given plenty of working to allow me to follow your solutions.

Regards presentation – I was pleased that you included plenty of space for comments. But you could, perhaps, reduce this a little in the future. I think a whole blank page after every question part may be a little too much. Thank you for your consideration though.

There are a few aspects of your communication which need attention. I have commented on them in orange and will summarise below.

Things to note for the future:

- Be careful with your use of the equals sign. It is for linking two equal quantities or expressions only (even if those expressions are on different lines). It is never used to start equations. If you start a line with an equals sign, you are equating what follows to the last thing you wrote on the line above. Make sure they really are equal!
- You need to be very aware of the difference between an expression and an equation. An expression consists of a number of terms linked with operators. An equation consists of two expressions linked with an equals sign. If there is no equals sign, it is not an equation. You can't solve expressions.

- It is not good practice to split up expressions or equations to deal with parts of them separately. It makes working hard to follow. Try to keep it together if you can.
- Make sure you <u>start</u> every calculation with something which tells us WHAT you are finding a value for. This can be a word, a phrase or an expression. Make sure that the calculation which follows really is what you've said you are working out a value for.
- If a question asks for an explanation, we expect a written explanation and not just a sum.
- If you use variables in your working which haven't been given in the question, then you must define them. Descriptive variable names are not generally used in maths (e.g. "min_prize"). These are used when writing programs in computing.
- You often wrote a multiplication sign as a subscript. Please make sure it is the same size and in the same position as your normal working. It is not a subscript.
- Think about providing a ***train*** of working, starting from a given expression and ending with the answer, with each expression linked to the next with an equals sign. There should be a clear link between the given expression and the eventual answer. If you interrupt that train at any point, e.g. for an explanation, then you must start afresh with a new train (i.e. with the given expression again). So, you need to think carefully about whether the explanations are really needed!

- Imagine that I'm not looking at the question when you write your answers. Make sure it is fully written in the context of the problem you are solving.
- Take careful note of the correct format for checks on solutions.
- The accuracy of rounded values is written in brackets after the number.
- Don't forget units of measurement if the problem is a practical one.
- If decimal digits fill your calculator screen then there is a high chance that the calculator has rounded the value to fit on the screen. You should assume that this is the case and finish with '…' to show that there are more digits not written. As you don't know if the last digit was rounded up or not, it is best to write fewer digits and finish with '…'.
- You should avoid using "/" for division. Fraction format is preferred. (Advisory)
- Keep equations together so that you can perform operations on the whole thing to keep it balanced. Make sure you do the same thing to both sides at all times.
- Take careful note of the correct format of checks on your solutions, and always include a check. See my comments and Unit 5, p.41 – 42.