

Outcomes

NS3.4 - Compares, orders and calculates with decimals, simple fractions and simple percentages

PAS3.1b - Constructs, verifies and completes number sentences involving the four operations with a variety of numbers.

WMS3.1 - Asks questions that could be explored using mathematics in relation to Stage 3 content

WMS3.2 - Selects and applies appropriate problem-solving strategies, including technological applications, in undertaking investigations

WMS3.5 - Links mathematical ideas and makes connections with, and generalisation about, existing knowledge and understanding in relation to Stage 3 content

Prior Learning

Students have modelled, compared and ordered fractions with whole and mixed numerals. Similar activities have been given with whole numbers and students have experienced working on an empty number line.

Description of Activity

Students respond to a scenario and record a variety of responses.

1. The teacher poses the question: 'The answer to a problem is one and a half, what might the question be?'
2. Students record a variety of questions, including word problems, number sentences and questions that involve more than one operation.
3. They include the four operations in their questions.

Resources

Blank paper, pens/pencils

Assessment Criteria

	E	D	C	B	A
NS3.4	• Only a few questions recorded.	• Only uses some of the operations.	• Uses all four operations successfully with few errors.	• Uses all operations accurately.	• All operations are used and number sentences are accurate.
PAS3.1b	• Lacks accuracy.	• Some questions are inaccurate.	• Uses and repeats a pattern.	• Uses a variety of question formats.	• More complex multi-step operations and word problems are included.
WS3.1	• Requires teacher support.	• Questions are similar in structure.	• Attempts to include multi-step number sentences.	• Basic multi-step operations used and word problems are included.	• Uses decimals and fractions.
WS3.2				• Fractions and/or decimals used.	• Demonstrates algebraic knowledge.
WS3.5					

Teacher Observations

Name:

Date:

The answer to a problem is one and a half, what might the question be?

Step 1:

Read the
question.



Step 2:

What is the
question
asking you?



Step 3:

What are you
going to do to
find the
answers?



Step 4:

Try to do the
question and
tell me what
you are
doing...



Step 5:

Write down
your answers



Step 6:

Do your
answers
make sense?



Student Work Sample (E)

1. Ashleigh had 2 apples, and she ate half of one, how many apples does she have now? $= \frac{1}{2}$

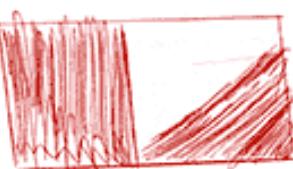
2. $2 \frac{1}{2} = 1 \frac{1}{2} = 1 \frac{1}{2}$

3. $2 \frac{1}{3}$

4.  $= 1 \frac{1}{2}$



5.  $= 1 \frac{1}{2} \text{ mL}$

6. 

$= 1 \frac{1}{2}$

Robyn has demonstrated elementary knowledge and understanding of fractions. Only a minimal amount of questions have been recorded and these lacked accuracy. Robyn has completed questions involving word problems and number sentences, but did not use all four operations or questions involving more than one operation. Robyn will need teacher assistance to accurately complete this task. This work sample demonstrates characteristics of work typically produced by a student performing at grade E standard at the end of Stage 3

Student Work Samples (D)

What's the problem?

$$1\frac{1}{2} + 0$$

$$1 + \frac{1}{2}$$

$$2 - \frac{1}{2}$$

$$1 \times 6 - 4\frac{1}{2}$$

$$5 \times 2 - 6\frac{1}{2}$$

$$12 \times 2 - 142\frac{1}{2}$$

$$0 + 1 + \frac{1}{2}$$

$$0 + 1\frac{1}{2}$$

$$1 + 0 + \frac{1}{2}$$

I had 6 fish fillets. I shared them with 5 friends.
How much was left.

$$\begin{array}{r} 5 \\ \times 3\frac{1}{2} \\ \hline \end{array}$$

Casey has demonstrated basic knowledge and understanding of fractions. Eleven questions have been created but many of these are similar in structure and some are inaccurate. Three operations have been used and basic questions involving more than one operation have been included. The word problem and division questions are incorrect, demonstrating a limited level of competence in these areas. This work sample demonstrates characteristics of work typically produced by a student performing at grade D standard at the end of Stage 3.

What's the problem? $1\frac{1}{2}$

1. $1\frac{1}{2} + 0 = 1\frac{1}{2}$

2. My brother had 1 biscuit and gave half
of my biscuits to him how much does he
have? $1\frac{1}{2}$

3. $1 + \frac{1}{2} = 1\frac{1}{2}$

4. $1 + 1 + 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = 1\frac{1}{2}$

5. $12 \times 2 - 142\frac{1}{2}$

6. $1 \times 6 - 4\frac{1}{2}$

Lee has demonstrated basic knowledge and understanding of the concepts and limited skills in mathematical processes. Six questions have been provided but three of these are very similar. Simple number sentences and simple word problems have been included but there is no use of division and little attempt has been made to use multiple operations in one question. This work sample demonstrates characteristics of work typically produced by a student performing at grade D standard at the end of Stage 3.

Student Work Samples (C)

$1\frac{1}{2}$

- 1 $1 + .5 =$ 15 $3 - 1.5 =$
- 2 $1.5 + 0 =$ 16 $3 \times .5 =$
- 3 $1.5 - 0 =$ 17 $3 \div 2 =$
- 4 $1.4 + 1 =$ 18 $2.5 - 1 =$
- 5 $1.3 + .2 =$ 19 $2.6 - 1.1 =$
- 6 $1.2 + 3 =$ 20 $2.7 - 1.2 =$
- 7 $1.1 + 4 =$ 21 $2.8 - 1.3 =$
- 8 $1.6 - 1 =$ 22 $2.9 - 1.4 =$
- 9 $1.7 - .2 =$ 23 $3.5 - 2 =$
- 10 $1.8 - .3 =$
- 11 $1.9 - .4 =$
- 12 $2 - 5 =$

Pat has demonstrated a sound understanding of fractions and decimals. All four operations have been successfully used but a pattern has been developed and repeated for each example using different words. The work is accurate but there is no demonstration of algebraic knowledge, fractions have not been used and all of the examples are single-step operations. This work sample demonstrates characteristics of work typically produced by a student performing at grade C standard at the end of Stage 3.

- 13 I had 3 oranges and wanted to share them ^{equally} between two friends. How many oranges would each get?
- 14 There were 3kg of apples which had to be shared between 2 markets. How much apples would each market get?

- 1 I am a mixed number more than $\frac{1}{2}$ and less than
- 2 Who am I?

$$1 \times 1 + 2 - 1 \frac{1}{2}$$

$$2 \cdot 5 - 1$$

I'm currently 1. Add 2 and divide the answer you get by 2. What number would I now be?

Add 2 and takeaway 1, add 3 and takeaway half of 3 + $\frac{1}{2}$. My answer is 2. What number was I at the start?

If you add $\frac{1}{2} + 1$, what do you get?

$$3.8 - 2.3$$

$$-3.8 + 5.3$$

$$\frac{3}{2} = y + \frac{1}{2}$$

$$3 + -1.5$$

$$3 \frac{1}{2}$$

$$1 + \frac{4}{8}$$

Alex has demonstrated sound knowledge and understanding of fractions using all four operations to give the answer 1.5. An adequate level of competence is evident in the word problems but half of these are incorrect. Both fraction and decimal sums have been used. Alex has made an attempt at algebra but this was not successful. This work sample demonstrates characteristics of work typically produced by a student performing at grade C standard at the end of Stage 3.

Student Work Sample (C)

<p>① $3 \div 2 = 1\frac{1}{2}$ ② $1 + \frac{1}{2} = 1\frac{1}{2}$ ③ Two people had to share three chocolate bars, but there were three chocolate bars. How many chocolate bars will they get and how will they get them? Cut one in half and both get $1\frac{1}{2}$ chocolate bars.</p> <p>④ $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1\frac{1}{2}$ ⑤ $12 - 10\frac{1}{2} = 1\frac{1}{2}$ ⑥ $4 - 2\frac{1}{2} = 1\frac{1}{2}$ ⑦ $11 - 8\frac{1}{2} = 1\frac{1}{2}$ ⑧ $10 - 8\frac{1}{2} = 1\frac{1}{2}$ ⑨ $9 - 7\frac{1}{2} = 1\frac{1}{2}$ ⑩ $8 - 6\frac{1}{2} = 1\frac{1}{2}$ ⑪ $7 - 5\frac{1}{2} = 1\frac{1}{2}$ ⑫ $6 - 4\frac{1}{2} = 1\frac{1}{2}$ ⑬ $5 - 3\frac{1}{2} = 1\frac{1}{2}$ ⑭ $3 - 1\frac{1}{2} = 1\frac{1}{2}$ ⑮ $0 + 1\frac{1}{2} = 1\frac{1}{2}$ ⑯ $0 + 1 + \frac{1}{2} = 1\frac{1}{2}$ ⑰ $1 \times 1\frac{1}{2} = 1\frac{1}{2}$ ⑱ $1\frac{1}{2} \div 1 = 1\frac{1}{2}$ ⑲ $\frac{1}{2} \times 3 = 1\frac{1}{2}$ ⑳ $(2 \times \frac{1}{2}) + \frac{1}{2} = 1\frac{1}{2}$ ㉑ $(1 \times \frac{1}{2}) + (\frac{1}{2} \times 2) = 1\frac{1}{2}$ ㉒ $(3 \times \frac{1}{2}) + 0 = 1\frac{1}{2}$ ㉓ $(4 \times \frac{1}{2}) - \frac{1}{2} = 1\frac{1}{2}$ ㉔ $(5 \times \frac{1}{2}) - 1 = 1\frac{1}{2}$ ㉕ $(6 \times \frac{1}{2}) - 1\frac{1}{2} = 1\frac{1}{2}$ ㉖ $(7 \times \frac{1}{2}) - 2 = 1\frac{1}{2}$ ㉗ $(8 \times \frac{1}{2}) - 2\frac{1}{2} = 1\frac{1}{2}$ ㉘ $(9 \times \frac{1}{2}) - 3 = 1\frac{1}{2}$ ㉙ $(10 \times \frac{1}{2}) - 3\frac{1}{2} = 1\frac{1}{4}$ ㉚ $13 - 11\frac{1}{2} = 1\frac{1}{2}$</p>	<p>㉛ $14 - 12\frac{1}{2} = 1\frac{1}{2}$ ㉜ $15 - 13\frac{1}{2} = 1\frac{1}{2}$ ㉝ $16 - 14\frac{1}{2} = 1\frac{1}{2}$ ㉞ $17 - 15\frac{1}{2} = 1\frac{1}{2}$ ㉟ $18 - 16\frac{1}{2} = 1\frac{1}{2}$ ㉟ $19 - 17\frac{1}{2} = 1\frac{1}{2}$</p>	
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Ariel has shown sound knowledge and understanding of fractions and a variety of operations that equal 1.5. Division sums were used sparingly and incorrectly, indicating problems with this operation. Ariel has relied heavily on subtraction and has followed a pattern for the use of subtraction, showing an adequate level of competence with questions that involved more than one operation. Ariel could have included more word problems and questions involving decimals. This work sample demonstrates characteristics of work typically produced by a student performing at grade C standard at the end of Stage 3.

Student Work Samples (B)

$$\frac{1}{2}$$

1. $3 - \frac{1}{2} =$

2. I had 100 bails of hay. The horses ate $99\frac{1}{2}$. How many bales do I have left?

3. $(1 \times 3) \div 2 =$

4. $7 \times 7 \div 7 - 6\frac{1}{2}$

5. The farmer had planned to grow $3\frac{1}{2}$ tonnes of bananas. After the cyclone 2 tonnes had been ruined. How many tonnes were left?

6. $(100 \div 2) - (25 \div 5) + 2 \div 0.5 =$

7. $19 - 17\frac{1}{2} =$

8. $5 - 3 - \frac{1}{2} =$

9. $\frac{1}{2} \times 3 =$

10. $(6 \div 2) - 1 \div 5 =$

11. $100 - 98\frac{1}{2} =$

12. $1\frac{1}{2} \times 1 =$

Ricky has demonstrated thorough knowledge and understanding of fractions and decimals. All four operations have been used with a high level of competence and a variety of questions, including word problems and number sentences, have been included. Although the early questions do not deal with the specified answer, they are mostly accurate and real-life situations have been used. Ricky has used some questions involving more than one operation but could have shown greater complexity overall. This work sample demonstrates characteristics of work typically produced by a student performing at grade B standard at the end of Stage 3.

I had 4 lollies but gave away 2 and a half of them, how many do I have now?

* $0 + 1\frac{1}{2}$

* $3 - 1\frac{1}{2}$

* $1 + \frac{1}{2}$

* $2 - \frac{1}{2}$

* $10 - 9 + \frac{1}{2}$

* $20 - 19 + \frac{1}{2}$

* $20 \div 10 - \frac{1}{2}$

* $1 \times 1 + \frac{1}{2}$

* $10 \div 10 + \frac{1}{2}$

* $5.0 - 3.5$

* $1 + \frac{1}{2} + \frac{1}{2}$

* $6.0 - 4.5$

* $7.0 - 5.5$

* $8.0 - 6.5$

I had 10 pieces of lego but lost $8\frac{1}{2}$, how many am I left with?

* $9.0 - 7.5$

* $10.0 - 8.5$

* $10 \times 10 - 90 + 10 - 18\frac{1}{2}$

* $1 \times 1 - \frac{1}{2}$

* $2 \times 2 - 3\frac{1}{2}$

* $(10+5) - (12+2) + \frac{1}{2}$

* $2 - \frac{1}{2} + 0$

* $10 + 1 - 9\frac{1}{2}$

* $1 + 2 + 1 = 2\frac{1}{2}$

* $5 + 5 - 8\frac{1}{2}$

Darcy has demonstrated thorough knowledge and understanding of fractions and decimals. All operations were used with a high level of competence. Darcy has used a variety of questions, including word problems, number sentences and questions involving more than one operation. The questions used were reasonably accurate, although they could have shown greater complexity. The use of algebraic knowledge is not evident. This work sample demonstrates characteristics of work typically produced by a student performing at grade B standard at the end of Stage 3.

Student Work Samples (A)

$$1. 2.5 - 1 = 1\frac{1}{2}$$

$$2. \frac{3}{2} = 1\frac{1}{2}$$

$$3. \left\{ \left[\frac{(3 \times 2) - 5}{6} \right] + \frac{1}{2} \right\} = 1\frac{1}{2}$$

4. I have 12 lollies, if I sell 3 and eat $7\frac{1}{2}$ how many do

Jo has demonstrated extensive knowledge and understanding of fractions and the four operations. A variety of creative, multi-step problems has been used, including word problems and number sentences. There is an understanding of the conversion of decimals to fractions, and algebraic knowledge has been demonstrated. All examples are correct and mathematical language has been used. This work sample demonstrates characteristics of work typically produced by a student performing at grade A standard at the end of Stage 3.

I have left ?

5. It is -5°C outside, inside it is -3.5°C what is the temperature difference?

6. $\square \times 3 = 4\frac{1}{2}$, what goes in \square ?

1. What is half of 3?

2. $1+2+3-4\frac{1}{2}=$

3. Little Joe had 5 lollipops. He ate 3 lollipops and got half way through another one. How many were left?

4. $1.5 - 0.00 =$

5. Jack had \$5. He spent \$3.50 on a yo-yo. How much money did he have left?

6. Tom had to go to the doctors at 6:30^{am}. It's 5:00^{pm}. How long is it until his appointment?

7. $\underline{\begin{array}{r} 77 \\ 75\frac{1}{2} \end{array}}$

8. $9 - 7\frac{1}{2} =$

9. An owl lost half of his foot in an accident. How many does he have left?

10. 2 of Arnolds finger nails added together measures 3 cm. What How long would 1 be?

11. $3 \times 1 - 1\frac{1}{2} =$

Sam has used a variety of creative questions, including word problems and number sentences based on money, time and fractions. The four operations have been used in the questions, and multi-step problems have been included. Fractions have been applied to real-life problems and mathematical terminology has been used appropriately. Sam has demonstrated the ability to link ideas and concepts. This work sample demonstrates characteristics of work typically produced by a student performing at grade A standard at the end of Stage 3.