

NumberSense Assessment Portfolio – Grade 3

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Name: _____

Class: _____

- You should complete this assignment in class and work alone.
- Complete all answers on this question paper.
- You may use your NumberSense Workbook or any other Mathematics notes to help you, but you should not use a calculator.
- You should complete this assignment in no more than 40 minutes.
- This assignment is for 20 marks.

1. Make the sides equal.

a. $267 = 200 + \underline{\hspace{2cm}} + 7$ (1)

b. $25 + \underline{\hspace{2cm}} = 31$ (1)

c. $\underline{\hspace{2cm}} = 36 - 9$ (1)

d. Double 28 = $\underline{\hspace{2cm}}$ (1)

e. $7 \times 4 = \underline{\hspace{2cm}}$ (1)

f. Double $\underline{\hspace{2cm}} = 46$ (1)

2. Sara sells cupcakes at a sale. She has 80 cupcakes and at the end of the day she only has 15 left. How many cupcakes did Sara sell? Show your thinking.

$\underline{\hspace{2cm}}$ cupcakes (2)

3. Dad pays Fundi, Ben and Yusuf R57 for cleaning his car. Show how they should share the money equally. How much money will each one get?

Each one gets R_____ (3)

4. The next week, Dad gives Fundi, Ben and Yusuf 10 chocolate bars for cleaning his car. Show how they should share the chocolate equally. How much chocolate does each one get?

Each one gets _____ chocolate bars (3)

5. One book costs R15. Complete the table.

Number of books	1	2	4	5	10	
Cost (R)	15	30		75		180

(3)

6. Try to figure out how this table works, then fill in the missing numbers.

Number	2	3	4	5	6	10	12	
Number's friend	5	7	9	11		21		31

(3)

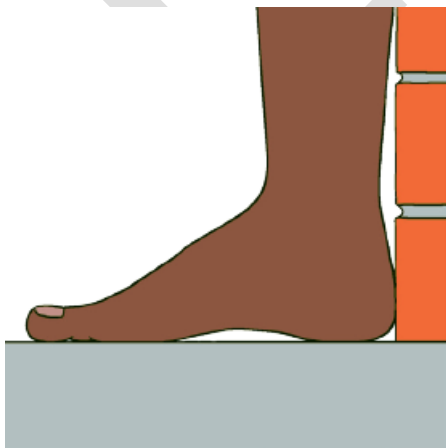
THE END

Project: How does shoe size change with age?

(NumberSense Workbook 10, pages 56 – 62)

Project description

- Your teacher will assign you to a group to complete this project.
- Working as a group you will complete the research activity described on pages 53 to 61.
- This project is for 25 marks and will be marked using the rubric provided.
- This project is due on _____



Names of group members: _____

Group's data collection and conclusion (pg. 56)	<p>3</p> <p>Lengths of 5 left and 5 right feet are accurately recorded in the table with corresponding ages.</p> <p>Accurate conclusion drawn about the relationship between lengths of left and right feet.</p>	<p>2</p> <p>Lengths of at least 4 left and 4 right feet are recorded in the table with corresponding ages.</p> <p>Conclusion drawn about the relationship between lengths of left and right feet.</p>	<p>1 0</p> <p>Lengths of at least 2 left and 2 right feet is recorded in the table with corresponding ages. The accuracy of the measurements is questionable.</p> <p>No conclusion or incorrect conclusion drawn about the relationship between lengths of left and right feet</p>	[3]
Playground's data collection (p. 57)	<p>5</p> <p>Lengths of left and right feet of 21 children of appropriate age are accurately recorded in the table.</p>	<p>4 3</p> <p>Lengths of left and right feet of at least 16 children of appropriate age are recorded in the table.</p>	<p>2 1 0</p> <p>Lengths of left and right feet of less than 16 children of appropriate age are recorded in the table. The accuracy of the measurements are questionable.</p>	[5]
Data organisation 1 (pg. 58)	<p>3</p> <p>The shoe size for all children whom data was collected for is correct.</p>	<p>2</p> <p>The shoe size for more than half the children whom data was collected for is correct.</p>	<p>1 0</p> <p>The shoe size for half or less than half the children whom data was collected for is correct.</p>	[3]
Shared data collection (pg. 59)	<p>4</p> <p>Group has collaborated well with other groups to collect 12 sets of data within each of their allocated ages.</p>	<p>3 2</p> <p>Group has collaborated with other groups to collect more than half the required sets of data within each of their allocated ages.</p>	<p>1 0</p> <p>Group has collected half or less than half the required sets of data within each of their allocated ages.</p>	[4]

Data organisation 2 (pg. 60-61)	6 5 Stamps have been placed neatly and without gaps or overlapping so that the summary charts accurately reflects all the data collected within each of the allocated ages.	4 3 2 Summary charts mostly reflect all the data collected within each of the allocated ages. There may be some gaps or overlapping, but this does not distort the message of the summary sheet.	1 0 Stamps do not reflect the data collected or gaps and overlapping creates a different impression from the original data.	[6]
Data interpretation (pg. 62)	4 Interpretation shows evidence of a thoughtful analysis and explanation of the data presented in the summary sheets and table.	3 2 Interpretation shows some evidence of a thoughtful analysis but the link with what is presented in the summary sheets and table may lack some clarity.	1 0 Vague interpretation or the interpretation is not supported by evidence in the data.	[4]
TOTAL				[25]

Teachers comments:

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Investigation

Determining different ways of filling rectangles with pentominoes and which rectangles can and cannot be filled with pentominoes.

Instructions:

- Complete this investigation in class working alone.
- There are three parts to this investigation which you will complete over 2 days
- You may use your NumberSense Workbook or any other notes to help you.
- This investigation is for 20 marks.
- Total time allocation: 2 hours

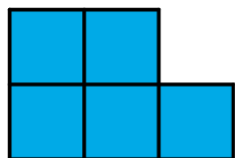
Name: _____

Class: _____

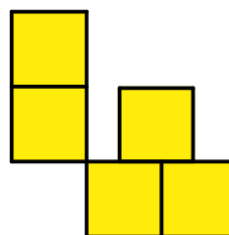
Part 1 (to be completed in class)

[5 marks]

A *pentomino* is a shape made up of 5 squares that are the same size and connected edge to edge.

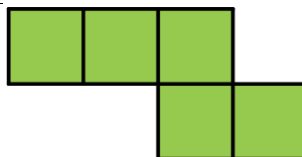


These are two different pentominoes.



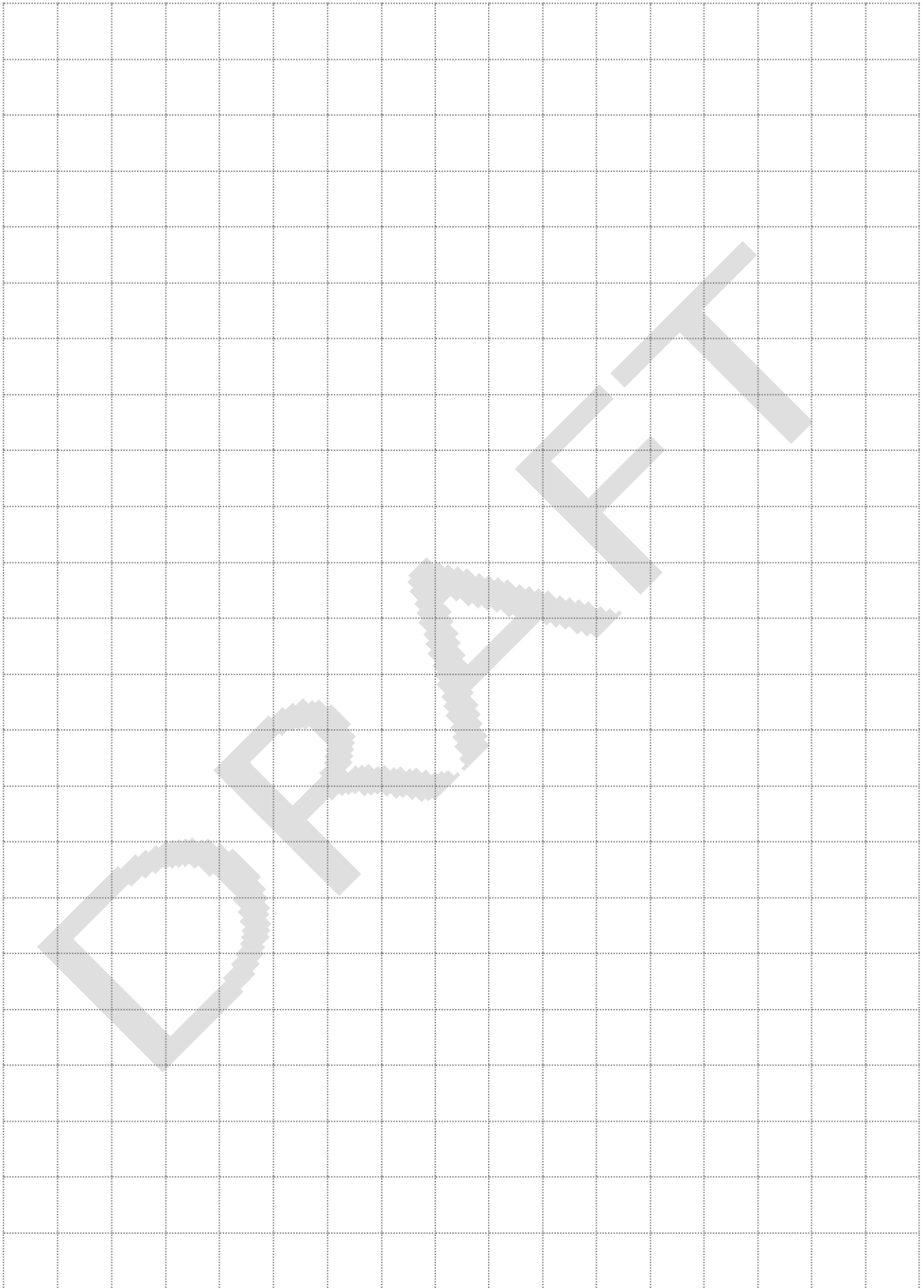
This is not a pentomino. It is not connected edge to edge.

These two pentominoes are the same. It has just been turned around to be in a different position.



Create as many different pentominoes as you can. Record these on square paper.

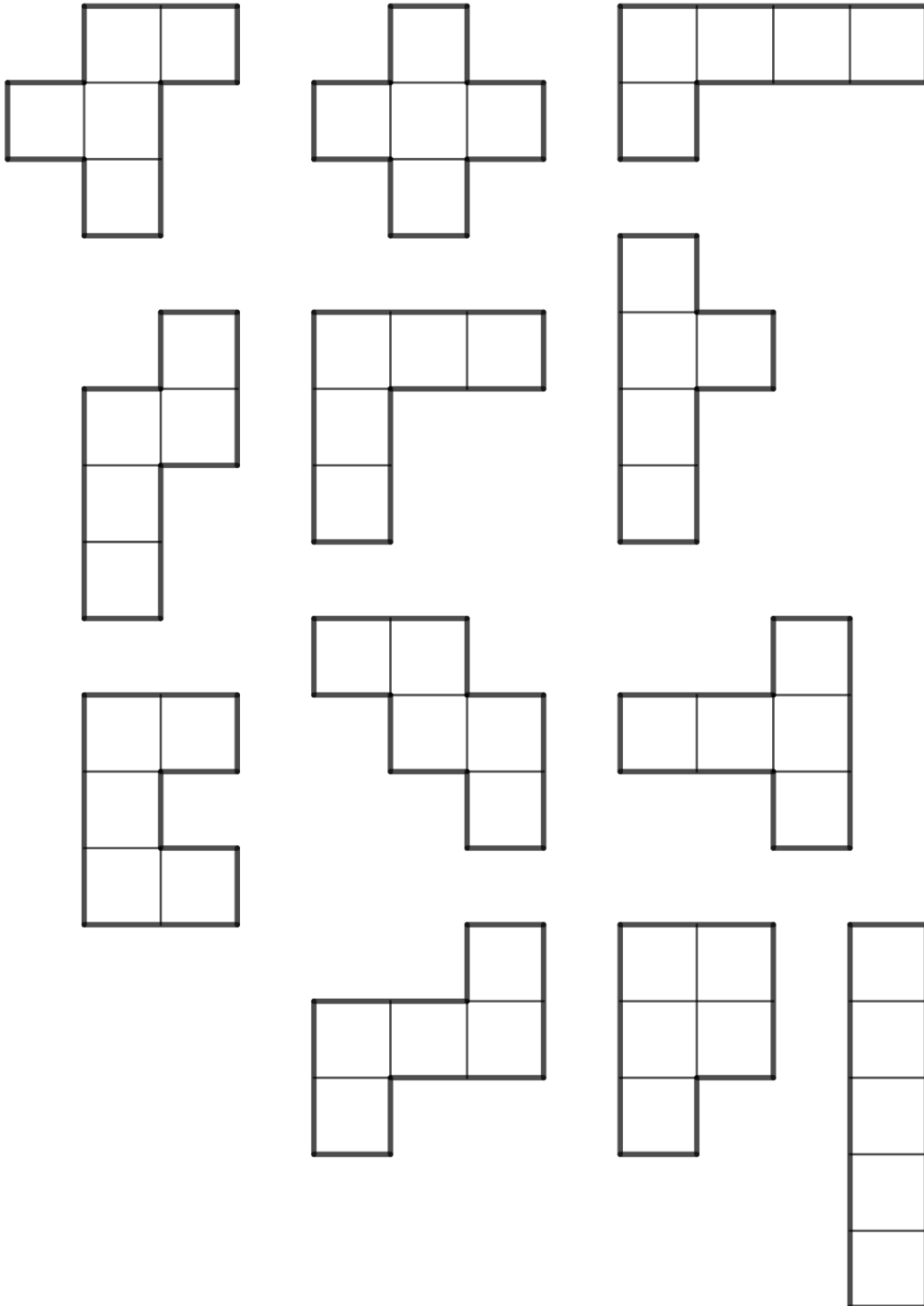
You should include the examples in your set of pentominoes.



Part 2 (to be completed at home)

Here are the twelve possible pentominoes. Did you create them all?

Accurately draw all the pentominoes on cardboard. Cut these out and bring them to class, ready to complete Part 3 of this investigation.

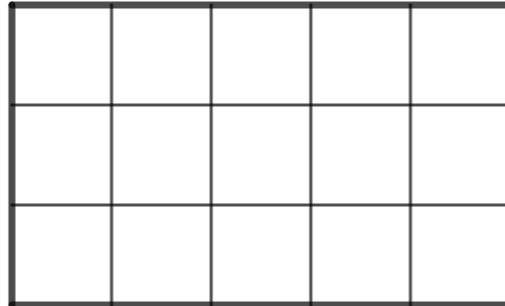
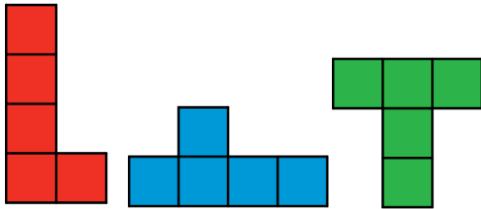


Part 3 (to be completed in class)

[15 marks]

Use the twelve pentominoes that you have cut out to answer the following questions.

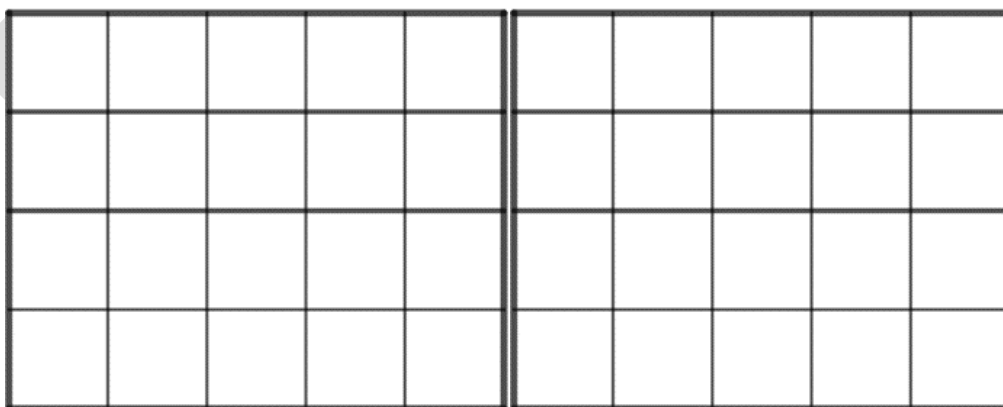
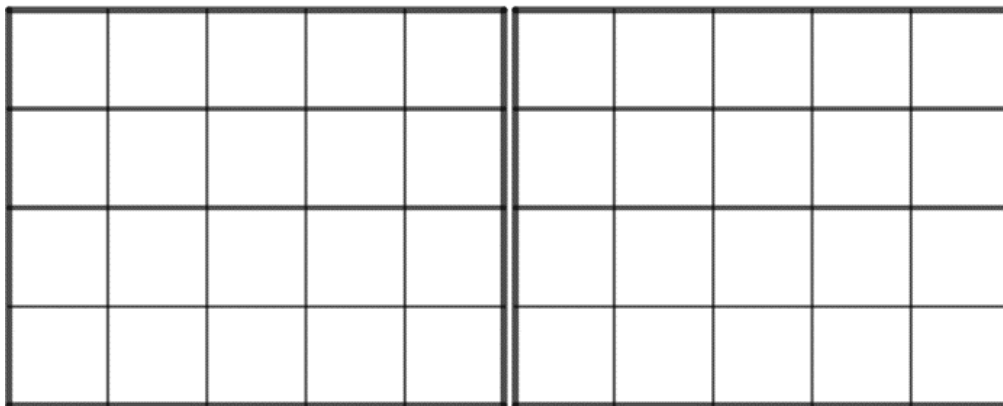
1. Use these three pentominoes to make a 3-by-5 rectangle.



Record how you would do it on this rectangle.

(2)

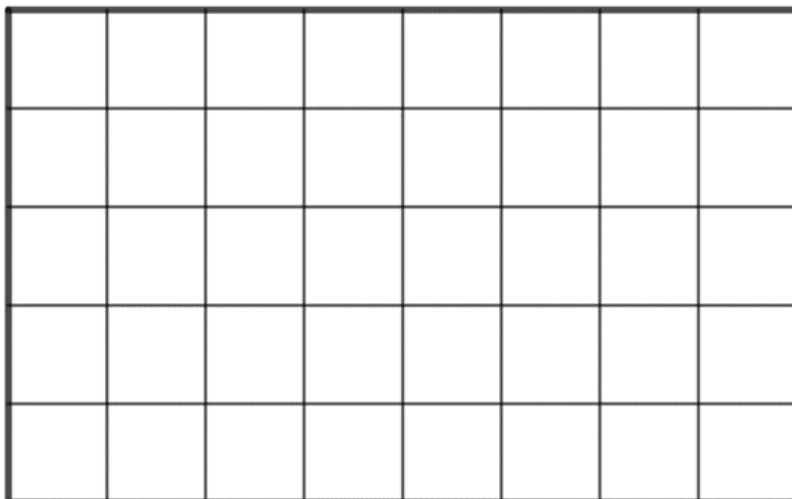
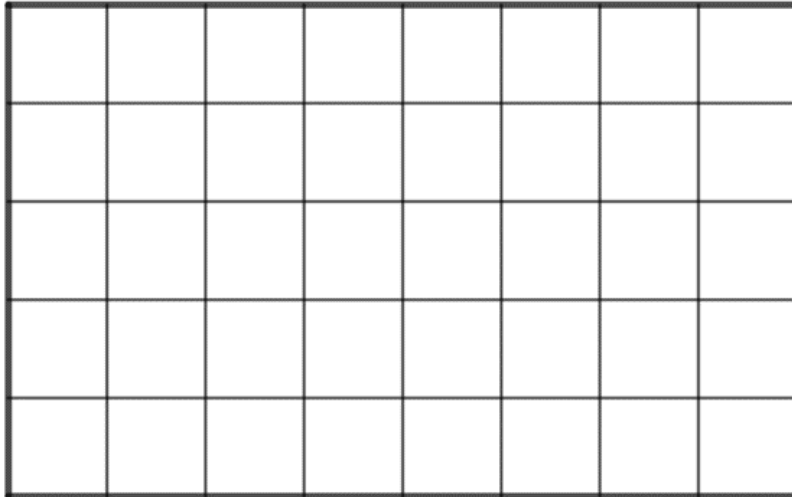
2. Use four different pentominoes to make a 4-by-5 rectangle. How many different solutions can you find? Try to record at least three different solutions.



(3)

3. Use eight different pentominoes to make an 8-by-5 rectangle.

How many different solutions can you find? Try to record at least two different solutions.



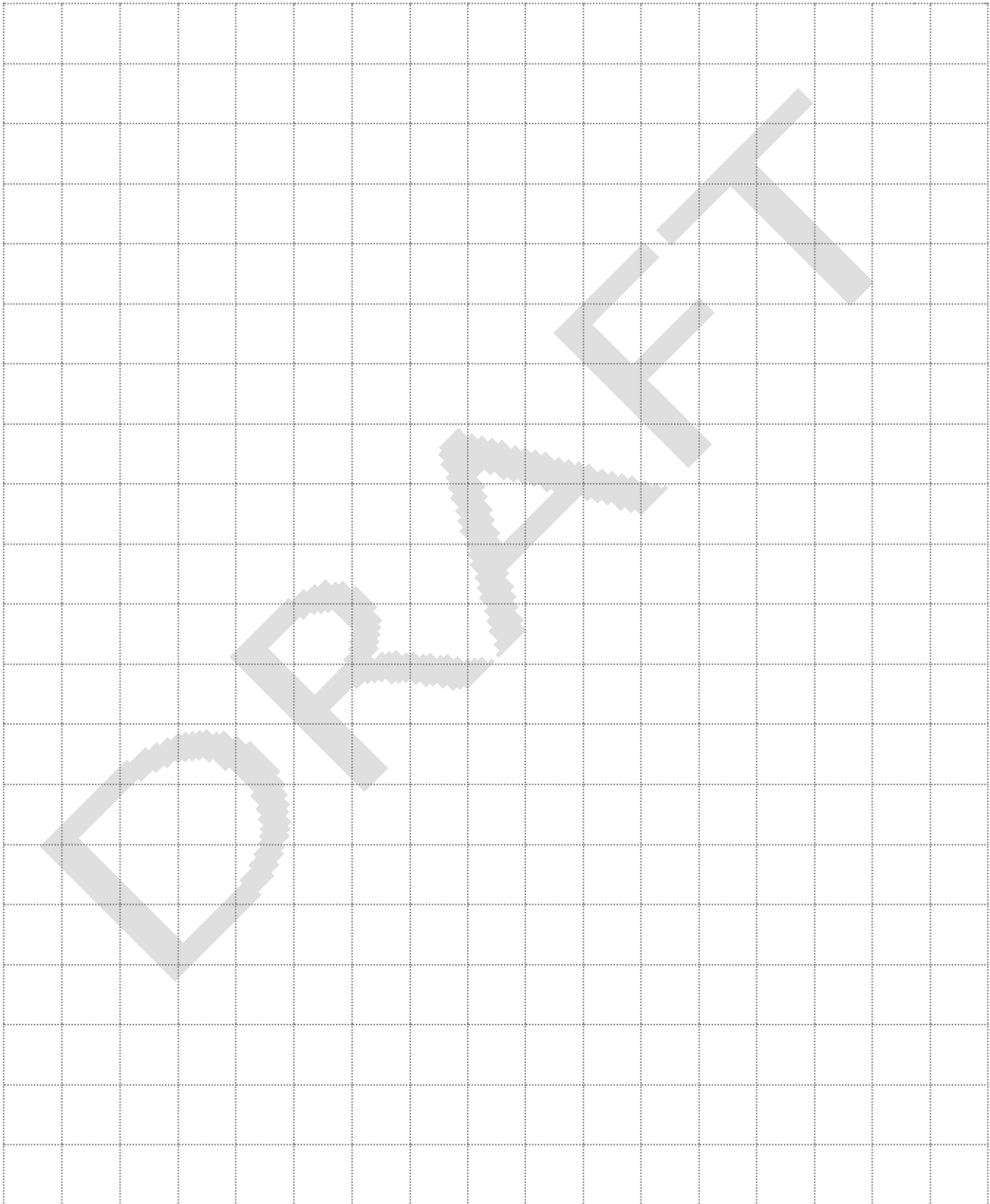
(2)

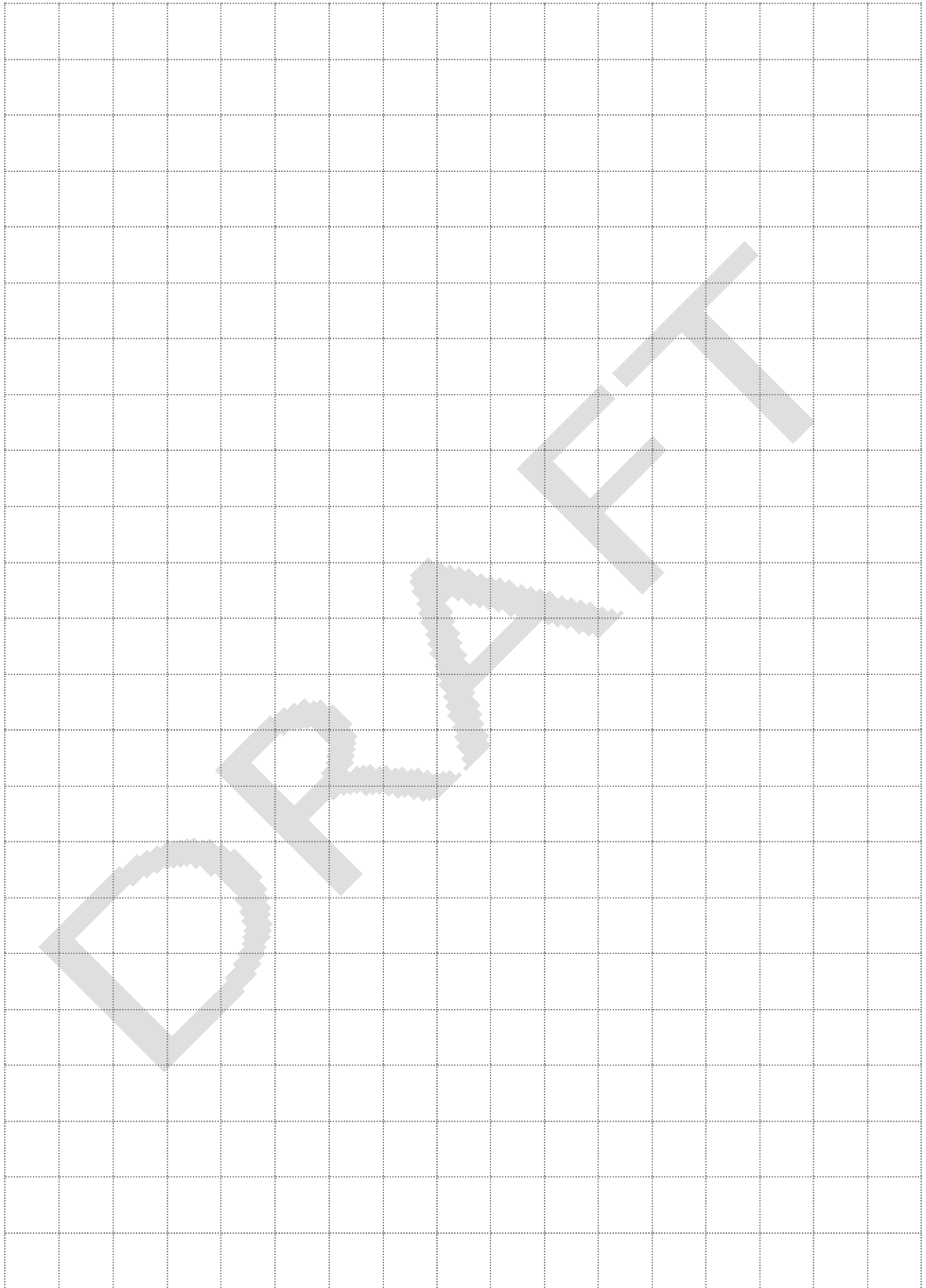
4. Is it possible to use the pentominoes to make a 3-by-4 rectangle? Explain your answer.

(2)

5. How many different rectangles could you make using all twelve pentominoes? Try to make each rectangle and record your solutions on square paper. If a rectangle cannot be made, you should say so.

(6)





Investigation

Which pieces of the Mosaic Puzzle cover the same amount of space?

Instructions:

- Complete this investigation in class working alone.
- You will need 3 × Mosaic Puzzle sets
- You may use your NumberSense Workbook or any other notes to help you.
- This investigation is for 15 marks. It will be marked using the rubric over the page.
- Time allocation: 30 minutes



1. How many of piece 1 are needed to cover the same amount of space as piece 3? Trace the pieces to explain your answer.
2. Does piece 4 cover the same amount of space as piece 7 does? Trace the pieces to explain your answer.
3. Fundi says that piece 4 covers the same amount of space as 1 and 1-half of piece 5. Do you agree with her? Use a drawing to explain.

Name: _____

Conceptual understanding of “covering space”	3 It is clear that the learner has understood the meaning of shapes “covering space” in all the questions.	2 There is some evidence that learner has understood the concept of “covering space”; however, there is also evidence of confusion.	1 / 0 1: Learner shows little understanding or no understanding of the concept of “covering space”. 0: The learner has made no attempt to answer the question.	[3]
Reasoning about relationships between amount of space in question 1	3 The learner has clearly demonstrated that piece 1 and piece 2 cover the same amount of space and has argued that because piece 3 is covered by two each of pieces 1 and 2, four piece 1s would cover the same amount of space as piece 3.	2 The learner has demonstrated an awareness of the relationship in space covered by pieces 1 and 2 and that two of each pieces 1 and 2 are needed to cover piece 3. However, they are unable to complete the argument.	1 / 0 1: The learner has demonstrated some understanding of a relationship between the space covered by the pieces. 0: The learner has made no attempt to answer the question.	[3]
Reasoning about relationships between amount of space in question 2	3 The learner has clearly demonstrated that: piece 4 is covered by either three piece 2s or two piece 1s and one piece 2; that piece 7 is covered by either one piece 1 and two piece 2s or three piece 1s; and, that because pieces 1 and 2 cover the same amount of space, it follows that pieces 4 and 7 cover the same amount of space.	2 The learner has made progress in establishing different combinations of pieces 1 and 2 that cover pieces 4 and 7, but has been unable to complete the argument.	1 0 1: The learner has demonstrated some understanding of a relationship between the space covered by the pieces. 0: The learner has made no attempt to answer the question.	[3]

Reasoning about relationships between amount of space in question 3	<p>3</p> <p>The learner agrees and has demonstrated that because piece 5 is covered by one of each piece 1 and 2 and that piece 4 is covered by either three piece 2s or two piece 1s and one piece 2, it follows that piece 4 covers 1 and 1-half as much space as piece 5 does.</p>	<p>2</p> <p>The learner has made progress in establishing different combinations of pieces 1 and 2 that cover pieces 4 and 5. However, they have been unable to complete the argument.</p>	<p>1 0</p> <p>1: The learner has demonstrated some understanding of a relationship between the space covered by the pieces.</p> <p>0: The learner has made no attempt to answer the question.</p>	[3]
Communication of mathematical ideas	<p>3</p> <p>The learner has presented an easy-to-follow argument that is well-illustrated with appropriate tracings of the pieces.</p>	<p>2</p> <p>The learner has made a good attempt at presenting an argument; however, it is difficult to follow.</p>	<p>1 / 0</p> <p>1: The learner has tried to explain their thinking; however, it does not make sense.</p> <p>0: The learner has made no attempt to provide an explanation.</p>	[3]
TOTAL				[15]

Teachers comments:

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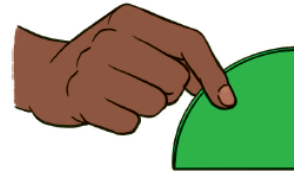
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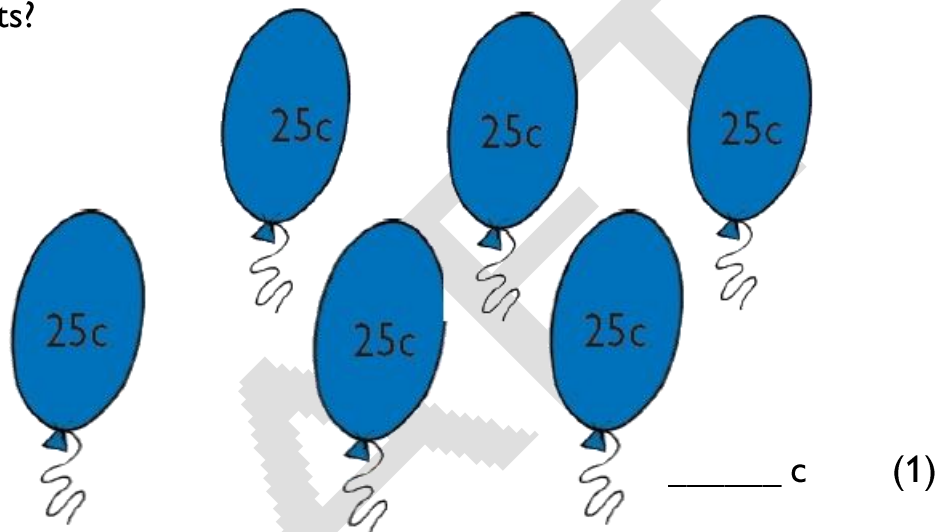
Name: _____

Class: _____

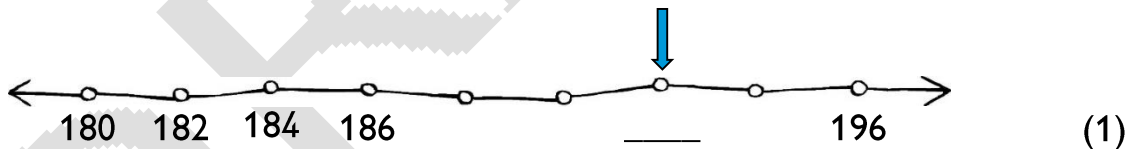
- Complete all answers on this question paper.
- Calculators may not be used.
- You may use your “right angle” corner.
- You should use a ruler marked in centimetres.



1. How many cents?



2. What number is the arrow pointing?



3. Sort from smallest to biggest.



_____ ; _____ ; _____ ; _____ (1)

4. This chocolate bar is cut into equal pieces. What is each piece called?



(1)

5. Complete. *Fill in the answer only.*

a. $428 = 400 + \underline{\hspace{2cm}} + 8$

(1)

b. $35 + 9 = \underline{\hspace{2cm}}$

(1)

c. $57 + \underline{\hspace{2cm}} = 100$

(1)

d. Double 36 = $\underline{\hspace{2cm}}$

(1)

e. $5 \times 4 = \underline{\hspace{2cm}}$

(1)

f. $15 \times \underline{\hspace{2cm}} = 30$

(1)

g. Double $\underline{\hspace{2cm}} = 58$

(1)

h. $24 + \underline{\hspace{2cm}} = \underline{\hspace{2cm}} - 10$

(1)

6. 47 books were donated to a school for the Grade 3 learners. There are 63 learners in Grade 3. How many more books do they need? Show your thinking.

_____ books (2)

7. 85 Grade 1s, 127 Grade 2s and 94 Grade 3s went on a school outing. How many children went on the outing? Show your thinking.

_____ children (2)

8. Mrs Jacobs bakes biscuits. She puts 6 biscuits in a box. She bakes 58 biscuits. How many boxes can she fill? Show your thinking.

_____ boxes (2)

9. Three children share 10 chocolate bars equally. How much chocolate will each child get? Show your thinking.

_____ chocolate (2)

10. Mrs Twala has 9 metres of material. She uses $1\frac{1}{2}$ metres to make one bag. How many bags can she make from her material? Show your thinking.

_____ bags (2)

11. Use these coins to show at least 3 more ways to make 100 cents. One way has been done for you.



- 50c + 50c

-
-
-

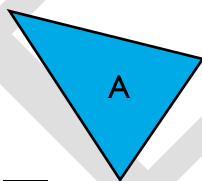
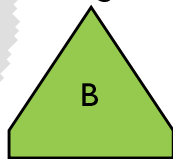
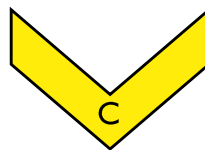
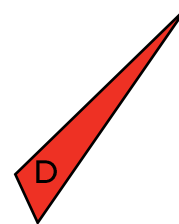
(2)

12. Mr Jacobs pays R5 per hour to park his car at the station. He also pays R12 to enter the parking garage. Complete the table.

Hours	1	2	3	4	5	10	
Rand	17	22	27				77

(4)

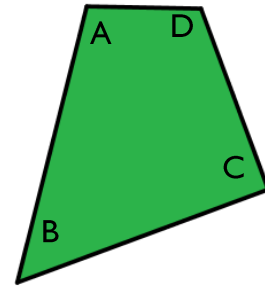
13. Which shapes are triangles? Select all that apply.


☐ A

☐ B

☐ C

☐ D

(1)

14. a. What do we call this shape? Select the best option.

- ☐ triangle
☐ quadrilateral
☐ square
☐ rectangle

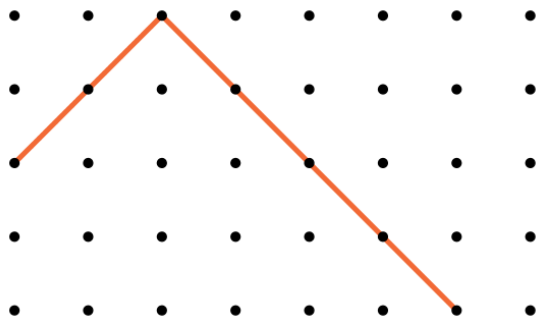


(1)

- b. Which of the corners is a right angle? Select the best option.

- ☐ A ☐ B ☐ C ☐ D (1)

15. a. Two sides of a rectangle has been drawn on the dotty grid. Complete the rectangle. *Do not draw out of the grid.*



(1)

- b. One side of a square has been drawn on the dotty grid. Complete the square. *Do not draw out of the grid.*



(1)

16. a. What is the most likely length of a bus? Select the best option.

☐ 2 cm☐ 12 cm☐ 12 m☐ 120 m

(1)

- b. What is the most likely weight of a tin of beans? Select the best option.

☐ 4 grams☐ 40 grams☐ 400 grams☐ 4 kilograms

(1)

17. Use a ruler to measure the length of this pencil to the nearest centimetre.

_____ cm



(1)

18. Kabelo measured the length of a TV screen to be 36 bottle tops long. Richard measured the same TV to be 24 matchsticks long.

If the length of a book is 8 matchsticks, how long is the book in bottle tops?

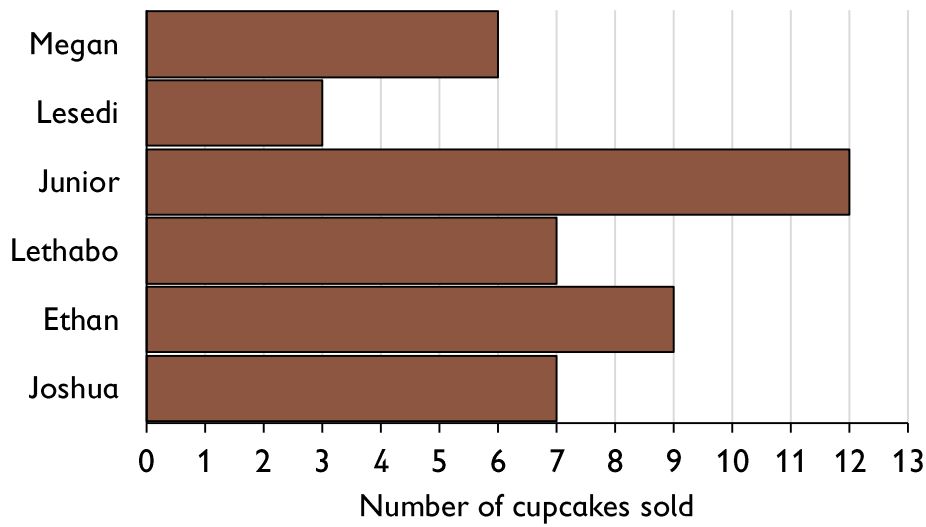
_____ bottle tops (1)

19. Write the time shown on this watch in words.



(1)

20. Joshua and his friends sell cupcakes. The bar graph records the number of cupcakes that they sell.


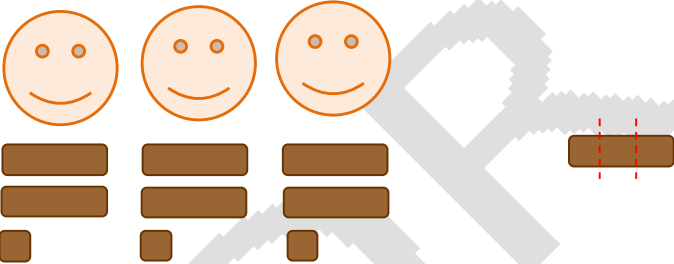


- a. Who sold the most cupcakes? _____ (1)
- b. How many cupcakes has Ethan sold? _____ cupcakes (1)

To prepare for this assessment, learners should have completed NumberSense Workbook 9, pages 1 – 40.

Memo:

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
1.a.	60	1 mrk: correct	NOR	9.11, 9.14, 9.21	K	(1)
1.b.	6	1 mrk: correct	NOR	9.8, 9.10	A	(1)
1.c.	27	1 mrk: correct	NOR	9.25	A	(1)
1.d.	56	1 mrk: correct	NOR	9.23, 9.38	A	(1)
1.e.	28	1 mrk: correct	NOR	9.9, 9.14, 9.28	A	(1)
1.f.	23	1 mrk: correct	NOR	9.23, 9.38	A	(1)
2.	65 <i>Possible thinking:</i> <ul style="list-style-type: none"> $15 + 5 \rightarrow 20 + 60 \rightarrow 80. 5 + 60 = 65$ $80 - 10 \rightarrow 70 - 5 \rightarrow 65$ 	1 mrk: 65 1 mrk: valid thinking	NOR	9.34	A	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
3.	<p><i>Possible thinking:</i></p> <ul style="list-style-type: none">  $R10$ $R10$ $R10$ $\rightarrow R30$ $R5$ $R5$ $R5$ $\rightarrow R15 \dots R45$ $R2$ $R2$ $R2$ $\rightarrow R6 \dots R51$ $R2$ $R2$ $R2$ $\rightarrow R6 \dots R57$ $R10 + R5 + R2 + R2 = R19$ $R57 - 3 \times R10 \rightarrow R27 - 3 \times R5 \rightarrow R12 - 3 \times R4 \rightarrow 0. R10 + R5 + R4 = R19$ 	<p>1 mrk: grouping in 3</p> <p>1 mrk: taking groups away from 57 or adding groups up to 57</p> <p>1 mrk: R19</p>	NOR	9.5	A	(3)
4.	<p><i>Possible thinking:</i></p> <ul style="list-style-type: none">  	<p>1 mrk: evidence of 3 children with 2 choc each (may be picture or number)</p> <p>1 mrk: evidence of a tenth choc being cut into three pieces</p> <p>1 mrk: 1 and 1 third</p>	NOR	9.26, 9.32	A	(3)

Ques	Correct solution(s)							Comment	Content area	Page ref.	Cognitive domain	Mark allocation																		
5.	<table><tr><td>Number of books</td><td>1</td><td>2</td><td>4</td><td>5</td><td>10</td><td>12</td></tr><tr><td>Cost (R)</td><td>15</td><td>30</td><td>60</td><td>75</td><td>150</td><td>180</td></tr></table>							Number of books	1	2	4	5	10	12	Cost (R)	15	30	60	75	150	180	1 mrk: EACH correct	PFA		A	(3)				
Number of books	1	2	4	5	10	12																								
Cost (R)	15	30	60	75	150	180																								
6.	<table><tr><td>Number</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>10</td><td>12</td><td>15</td></tr><tr><td>Number's friend</td><td>5</td><td>7</td><td>9</td><td>75</td><td>13</td><td>21</td><td>25</td><td>31</td></tr></table>							Number	2	3	4	5	6	10	12	15	Number's friend	5	7	9	75	13	21	25	31	1 mrk: EACH correct	PFA	9.30, 9.40	R	(3)
Number	2	3	4	5	6	10	12	15																						
Number's friend	5	7	9	75	13	21	25	31																						

This project is in NumberSense Workbook 10, pages 56 to 62. It can be completed at the end of Term 2 or at the beginning of Term 3. Teachers should assign learners to a group of 2 – 4 learners and allocate one set of age groups [6, 8 and 10 years old; 7, 9 and 11 years old; or 8, 10 and 12 years old] to each group

All questions can be answered in learners' NumberSense Workbooks. If teachers would prefer that projects are submitted in an alternative way (maybe for marking purposes), then they should advise the learners how to do so.

This project is assessed using this rubric.

Group's data collection and conclusion (pg. 56)	<p>3</p> <p>Lengths of 5 left and 5 right feet are accurately recorded in the table with corresponding ages.</p> <p>Accurate conclusion drawn about the relationship between lengths of left and right feet.</p>	<p>2</p> <p>Lengths of at least 4 left and 4 right feet are recorded in the table with corresponding ages.</p> <p>Conclusion drawn about the relationship between lengths of left and right feet.</p>	<p>1 0</p> <p>Lengths of at least 2 left and 2 right feet is recorded in the table with corresponding ages. The accuracy of the measurements is questionable.</p> <p>No conclusion or incorrect conclusion drawn about the relationship between lengths of left and right feet</p>	[3]
Playground's data collection (p. 57)	<p>5</p> <p>Lengths of left and right feet of 21 children of appropriate age are accurately recorded in the table.</p>	<p>4 3</p> <p>Lengths of left and right feet of at least 16 children of appropriate age are recorded in the table.</p>	<p>2 1 0</p> <p>Lengths of left and right feet of less than 16 children of appropriate age are recorded in the table. The accuracy of the measurements are questionable.</p>	[5]
Data organisation 1 (pg. 58)	<p>3</p> <p>The shoe size for all children whom data was collected for is correct.</p>	<p>2</p> <p>The shoe size for more than half the children whom data was collected for is correct.</p>	<p>1 0</p> <p>The shoe size for half or less than half the children whom data was collected for is correct.</p>	[3]
Shared data collection (pg. 59)	<p>4</p> <p>Group has collaborated well with other groups to collect 12 sets of data within each of their allocated ages.</p>	<p>3 2</p> <p>Group has collaborated with other groups to collect more than half the required sets of data within each of their allocated ages.</p>	<p>1 0</p> <p>Group has collected half or less than half the required sets of data within each of their allocated ages.</p>	[4]

Data organisation 2 (pg. 60-61)	6 5 Stamps have been placed neatly and without gaps or overlapping so that the summary charts accurately reflects all the data collected within each of the allocated ages.	4 3 2 Summary charts mostly reflect all the data collected within each of the allocated ages. There may be some gaps or overlapping, but this does not distort the message of the summary sheet.	1 0 Stamps do not reflect the data collected or gaps and overlapping creates a different impression from the original data.	[6]
Data interpretation (pg. 62)	4 Interpretation shows evidence of a thoughtful analysis and explanation of the data presented in the summary sheets and table.	3 2 Interpretation shows some evidence of a thoughtful analysis but the link with what is presented in the summary sheets and table may lack some clarity.	1 0 Vague interpretation or the interpretation is not supported by evidence in the data.	[4]
TOTAL				[25]

Please note that there are three parts to this assessment. Hand learners each part separately as Part 2 and 3 have the solutions to Part 1. Only Parts 1 and 3 are to be assessed.

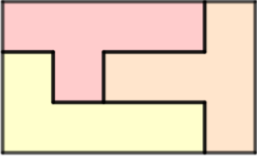
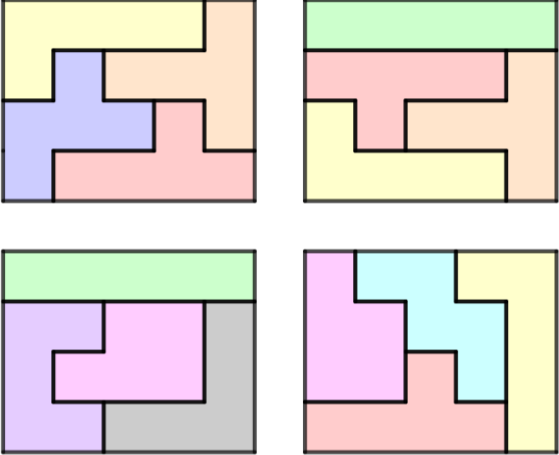
Part 1 should be done in class and the learners should work alone. It may be helpful to supply learners with at least 5 square tiles each.

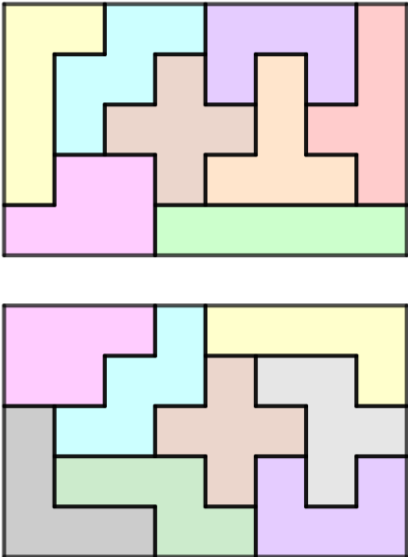
When learners have completed part 1, their work should be marked and teachers can give learners part 2 to make sure that they have all twelve pentominoes. Part 2 can be done at home. Part 2 will not be assessed but learners will need to have the pentomino pieces cut out to help them with part 3.

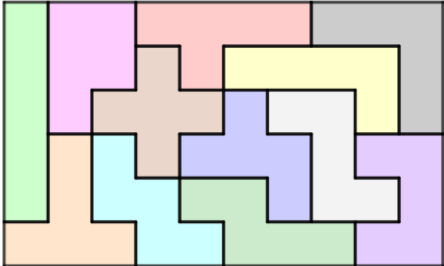
Part 3 should be done in class and the learners should work alone. The learners should complete part 3 in no more than 40 minutes.

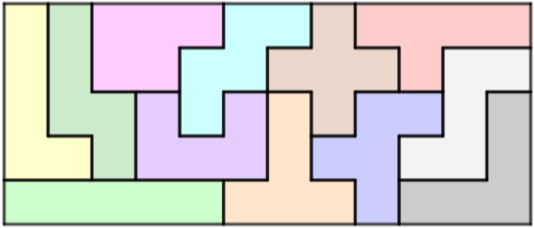
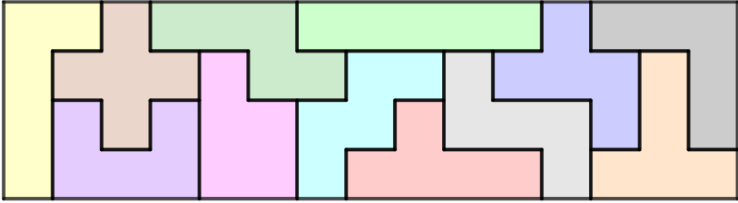
Memo:

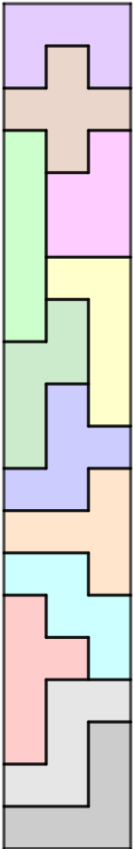
Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
P1	See all 12 pentominoes on the attached print master.	5 mrks: 12 unique solutions OR 4 marks: all 12 solutions and no more than 2 repeats or 10/11 unique solutions OR 3 mrks: 7 – 9 unique solutions OR 2 mrks: 4 – 6 unique solutions OR 1 mrk: 2 or 3 unique solutions	SS	9.47, 9.48, 9.52, 9.53, 10.46, 10.49	A	(5)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
P3. 1.	<i>Possible solution:</i> 	2 mrks: correct solution	SS		K	(2)
P3. 2.	<i>Possible solutions:</i> 	1 mrk: EACH solution correct (Max. 3 mrks)	SS		A	(3)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
P3. 3.	<p><i>Possible solutions:</i></p> 	2 mrks: ONE correct solution	SS		R	(2)
P3. 4.	<p>No, it is not possible, because there are 5 squares in a pentomino. When we join pentominoes to make rectangles there will be 5, 10, 15, 20, 25, 30 etc. (counting in 5s) squares in the rectangle.</p> <p>A 3-by-4 rectangle will have 4 rows 3 squares which is 12 squares. We do not count 12 when we count in 5s.</p>	2 mrks: “not possible” AND valid reason	SS		R	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
P3. 5.	<p>Using all 12 pentominoes means that there will be $12 \times 5 =$ <i>half of</i> $120 = 60$ squares in the rectangle. If we think about an equal number of squares in each row, then the only rectangles that we can make with 60 squares are:</p> <ul style="list-style-type: none"> • 6 by 10 (or 10 by 6), • 5 by 12 (or 12 by 5), • 4 by 15 (or 15 by 4) and • 3 by 20 (or 20 by 3). <p><i>One possible solution for each is given:</i></p> <p><u>6 by 10 rectangle</u></p> 	<p>2 mrks: only 4 correct rectangles identified</p> <p>OR</p> <p>1 mrk: 3 correct rectangles identified and no others or 4 correct rectangles identified and at most 1 incorrect rectangle</p> <p>AND</p> <p>1 mrk: EACH complete solution provided for the different rectangles.</p>	SS		R	(6)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
	<p><u>5 by 12 rectangle</u></p> 					
	<p><u>15 by 4 rectangle</u></p> 					

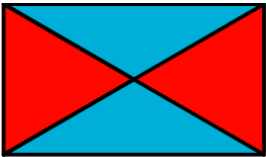


Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
	<p><u>20 by 3 rectangle</u></p> 					

This investigation should be done following pages 57 and 58 of Workbook 12. Learners will need to use at least 3 sets of Mosaic Puzzle pieces.



Some possible suggested answers are provided for each task and a marking rubric.

Memo:

Ques	Possible correct solution(s)	Content area	Cognitive domain
1.	<p>Piece 3 covers the same amount of space as 2 of piece 1 and 2 of piece 2. But, I know that piece 2 covers the same amount of space as piece 1, so piece 3 covers the same amount of space as 4 of piece 1.</p> 	M	A
2.	<p>Piece 4 covers the same amount of space as 3 of piece 2.</p> <p>Piece 7 covers the same amount of space as 2 of piece 2 and 1 of piece 1. But piece 1 covers the same amount of space as piece 2 so it will also cover the same amount of space as 3 of piece 2.</p> 	M	R
3.	<p>Lerato is correct because piece 4 covers the same amount of space as piece 5 and piece 1. I know that piece 1 is half of piece 5 because piece 5 covers the same amount of space as piece 1 and piece 2 which are equal.</p> 	M	R

Conceptual understanding of “covering space”	3 It is clear that the learner has understood the meaning of shapes “covering space” in all the questions.	2 There is some evidence that learner has understood the concept of “covering space”; however, there is also evidence of confusion.	1 / 0 1: Learner shows little understanding or no understanding of the concept of “covering space”. 0: The learner has made no attempt to answer the question.	[3]
Reasoning about relationships between amount of space in question 1	3 The learner has clearly demonstrated that piece 1 and piece 2 cover the same amount of space and has argued that because piece 3 is covered by two each of pieces 1 and 2, four piece 1s would cover the same amount of space as piece 3.	2 The learner has demonstrated an awareness of the relationship in space covered by pieces 1 and 2 and that two of each pieces 1 and 2 are needed to cover piece 3. However, they are unable to complete the argument.	1 / 0 1: The learner has demonstrated some understanding of a relationship between the space covered by the pieces. 0: The learner has made no attempt to answer the question.	[3]
Reasoning about relationships between amount of space in question 2	3 The learner has clearly demonstrated that: piece 4 is covered by either three piece 2s or two piece 1s and one piece 2; that piece 7 is covered by either one piece 1 and two piece 2s or three piece 1s; and, that because pieces 1 and 2 cover the same amount of space, it follows that pieces 4 and 7 cover the same amount of space.	2 The learner has made progress in establishing different combinations of pieces 1 and 2 that cover pieces 4 and 7, but has been unable to complete the argument.	1 0 1: The learner has demonstrated some understanding of a relationship between the space covered by the pieces. 0: The learner has made no attempt to answer the question.	[3]

Reasoning about relationships between amount of space in question 3	<p>3</p> <p>The learner agrees and has demonstrated that because piece 5 is covered by one of each piece 1 and 2 and that piece 4 is covered by either three piece 2s or two piece 1s and one piece 2, it follows that piece 4 covers 1 and 1-half as much space as piece 5 does.</p>	<p>2</p> <p>The learner has made progress in establishing different combinations of pieces 1 and 2 that cover pieces 4 and 5. However, they have been unable to complete the argument.</p>	<p>1 0</p> <p>1: The learner has demonstrated some understanding of a relationship between the space covered by the pieces.</p> <p>0: The learner has made no attempt to answer the question.</p>	[3]
Communication of mathematical ideas	<p>3</p> <p>The learner has presented an easy-to-follow argument that is well-illustrated with appropriate tracings of the pieces.</p>	<p>2</p> <p>The learner has made a good attempt at presenting an argument; however, it is difficult to follow.</p>	<p>1 / 0</p> <p>1: The learner has tried to explain their thinking; however, it does not make sense.</p> <p>0: The learner has made no attempt to provide an explanation.</p>	[3]
TOTAL				[15]

This examination covers all content from NumberSense Comprehensive Workbooks 9 and 10.

Assessment framework:		Cognitive domain						
		Knowing (K)		Applying (A)		Reasoning (R)		TOTAL
Content area	Number, operations and relationships (NOR)	1(1), 2(1), 3(1), 4(1), 5a(1), 5b(1), 5c(1), 5d(1), 5e(1), 5f(1)	10	5g(1), 6(2), 7(2), 8(2), 9(2)	9	5h(1), 10(2), 11(2)	5	24
	Patterns, functions & algebra (PFA)	12(2)	2	12(1)	1	12(1)	1	4
	Space & shape (SS)	13(1), 14a(1)	2	14b(1), 15a(1)	2	15b(1)	1	5
	Measurement (M)	16(2)	2	17(1), 19(1)	2	18(1)	1	5
	Data handling (DH)		.	20(2)	2			2
	TOTAL	16		16		8		40

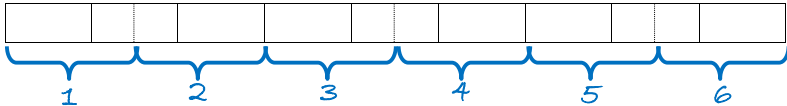
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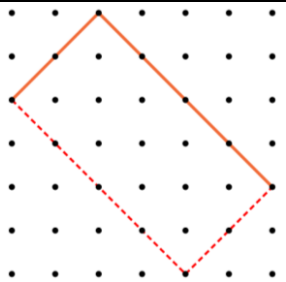
Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
1.	150	1 mrk: correct	NOR	9.20, 9.33, 9.45, 10.5, 10.33	K	(1)

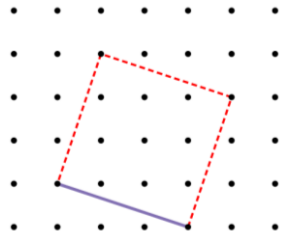
Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
2.	192	1 mrk: correct	NOR	9.38, 10.13, 10.22, 10.26	K	(1)
3.	156 ; 165 ; 516 ; 561	1 mrk: correct	NOR	9.31, 10.9	K	(1)
4.	fifths or $\frac{1}{5}$	1 mrk: correct <i>Do not penalise for spelling errors</i>	NOR	9.43, 9.44	K	(1)
5.a.	20	1 mrk: correct	NOR	9.3, 9.7, 9.11, 9.14, 9.21, 9.45	K	(1)
5.b.	44	1 mrk: correct	NOR	9.4	K	(1)
5.c.	43	1 mrk: correct	NOR	9.29, 10.2, 10.8	K	(1)
5.d.	72	1 mrk: correct	NOR	9.23, 9.38	K	(1)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
5.e.	20	1 mrk: correct	NOR	9.8, 9.19, 9.28, 9.42, 10.6	K	(1)
5.f.	2	1 mrk: correct	NOR	9.10	K	(1)
5.g.	29	1 mrk: correct	NOR	9.23, 9.38	A	(1)
5.h.	<p><i>There are many different possible answers. Please check that left-hand side and right-hand side are equivalent. Some possible solutions could be:</i></p> <ul style="list-style-type: none"> • $24 + 6 = 40 - 10$ • $24 + 5 = 39 - 10$ • $24 + 10 = 44 - 10$ 	1 mrk: correct	NOR	9.44	R	(1)
6.	<p>16</p> <p><i>Possible thinking:</i></p> <ul style="list-style-type: none"> • $47 + 3 \rightarrow 50 + 13 \rightarrow 63. 3 + 13 = 16$ • $47 + 10 \rightarrow 57 + 10 \rightarrow 67 - 4 \rightarrow 63. 10 + 10 - 4 = 16$ • $63 - 40 \rightarrow 23 - 3 - 4 \rightarrow 16$ 	<p>1 mrk: correct</p> <p>1 mrk: valid thinking</p>	NOR	9.12, 10.3	A	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
7.	306 <i>Possible thinking:</i> <ul style="list-style-type: none"> • $85 + 120 \rightarrow 205 + 7 \rightarrow 212 + 90 \rightarrow 302 + 4 \rightarrow 306$ • $80 + 120 + 90 = 290$ and $5 + 7 + 4 = 16$. $290 + 16 = 306$ 	1 mrk: correct 1 mrk: valid thinking	NOR	9.4, 10.12	A	(2)
8.	9 <i>Possible thinking:</i> <ul style="list-style-type: none"> • 6; 12; 18; 24; 30; 36; 42; 48; 54; 60-Counting: 9 • Drawing a picture of 58 biscuits and grouping in 6s may be correct (however inefficient) 	1 mrk: correct 1 mrk: valid thinking <i>There will be 4 leftover biscuits which learners may mention, but not required to answer this question.</i>	NOR	9.21, 9.33, 10.6	A	(2)
9.	3 and 1-third or $3\frac{1}{3}$ <i>Possible thinking:</i> <i>A drawing of 3 children. Each child has 3 chocolates as picture or number. One remaining chocolate is cut up into 3 pieces.</i>	1 mrk: correct 1 mrk: valid thinking	NOR	10.4, 10.36	A	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
10.	<p>6</p> <p>Possible thinking:</p> <ul style="list-style-type: none"> Using a picture:  <ul style="list-style-type: none"> $1\frac{1}{2} + 1\frac{1}{2} \rightarrow 3 + 1\frac{1}{2} \rightarrow 4\frac{1}{2} + 1\frac{1}{2} \rightarrow 6 + 1\frac{1}{2} \rightarrow 7\frac{1}{2} + 1\frac{1}{2} \rightarrow 9$ 	<p>1 mrk: correct</p> <p>1 mrk: valid thinking</p>	NOR	10.37, 10.39	R	(2)
11.	<p>There are another 6 ways to make 100c using these coins. Learners should list three unique ways from:</p> <ul style="list-style-type: none"> $50c + 20c + 20c + 10c$ $50c + 20c + 20c + 5c + 5c$ $50c + 20c + 10c + 10c + 10c$ $50c + 20c + 10c + 10c + 5c + 5c$ $20c + 20c + 20c + 20c + 10c + 10c$ $20c + 20c + 20c + 20c + 10c + 5c + 5c$ 	<p>2 mrks: 3 unique sums that make 100c</p> <p>1 mrk: 3 unique sums that make 100c</p> <p>Note: $50c + 20c + 20c + 10c$ is the same as $10c + 20c + 50c + 20c$</p>	NOR	10.41	R	(2)

Ques	Correct solution(s)								Comment	Content area	Page ref.	Cognitive domain	Mark allocation
12.	Hours	1	2	3	4	5	10	13	1 mrk: 32 (K) 1 mrk: 37(K) 1 mrk: 62 (A) 1 mrk: 13 (R)	PFA	10.20	K(2), A(1), R(1)	(4)
	Rand	17	22	27	32	37	62	77					
13.	A and D								1 mrk: both correct and no extra	SS	9.46, 10.46, 10.50	K	(1)
14.a.	quadrilateral								1 mrk: correct	SS	9.46, 10.46	K	(1)
14.b.	C								1 mrk: correct	SS	9.50, 9.51, 10.46, 10.48	A	(1)
15.a.									1 mrk: correct	SS	10.51	A	(1)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
15.b.		1 mrk: correct	SS	10.51	R	(1)
16.a.	12 m	1 mrk: correct	M	9.57	K	(1)
16.b.	400 grams	1 mrk: correct	M	9.62, 9.63	K	(1)
17.	8 cm	1 mrk: correct	M	10.56	A	(1)
18.	12	1 mrk: correct <i>1 matchstick = $1\frac{1}{2}$ bottle tops</i>	M	9.54, 9.55	R	(1)
19.	25 minutes to 3	1 mrk: correct <i>Do not penalise for spelling errors</i>	M	10.54, 10.55	A	(1)
20.a.	Junior	1 mrk: correct	DH	10.63, 10.64	A	(1)
20.b.	9	1 mrk: correct	DH	10.63, 10.64	A	(1)