

NumberSense Assessment Portfolio – Grade 4

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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 25 marks.

1. Predict which ONE of the following calculations will give the correct answer for $291 \div 24$. (You don't need to do the calculations.) Select the correct one.

☐ $291 \div 20 + 291 \div 4$

☐ $291 \div 8 + 291 \div 3$

☐ $240 \div 8 + 51 \div 3$

☐ $210 \div 24 + 81 \div 24$

☐ $312 \div 24 - 21$

(1)

2. Calculate $637 \div 7$. Show your thinking.

(2)

3. 100 marbles are divided among 6 boys. What is the smallest number of extra marbles that are needed so that each boy will receive the same number of marbles and there are none left over? Show your thinking.

_____ marbles (2)

4. Fikile uses 8 cups of milk to make 6 milk tarts. How many cups of milk does she need to make 8 milk tarts? Show your thinking.

_____ cups of milk (2)

5. Ben and Hanlie took strawberries from a basket. Ben took $\frac{1}{3}$ of the strawberries and Hanlie took $\frac{1}{6}$. What fraction of the strawberries remains in the basket? Show your thinking.

(2)

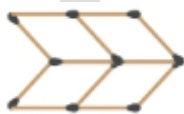
6. Jan had R15. His mom gave him another R6,75. He now has $\frac{3}{4}$ of the money he needs to buy a book. How much does the book cost? Show your thinking.

(3)

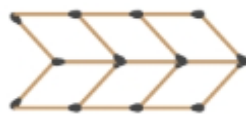
7. Fundi is making pictures with matchsticks like this. The first four pictures make a pattern.



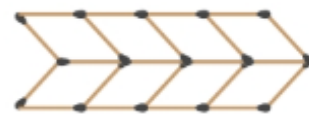
Picture 1



Picture 2



Picture 3



Picture 4

- a. Draw the fifth picture in the pattern.

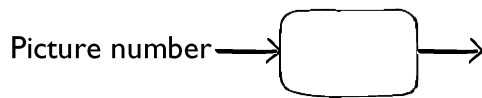
(1)

b. Complete.

Picture number	1	2	3	4	5	10	20
No. of matchsticks	7	12	17				

(3)

c. Draw a flow diagram that you can use to calculate the number of matchsticks for any picture number. One has been started for you.



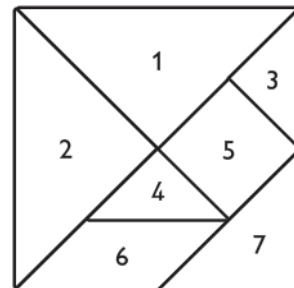
(2)

d. Use the flow diagram to determine which Picture number can be made using exactly 82 matchsticks. Show your thinking

Picture _____

(2)

8. Refer to the number of the Tangram puzzle pieces alongside.



a. Use the pieces to demonstrate that the areas of piece 5 and 6 are equal. Trace the pieces to show how you did it.

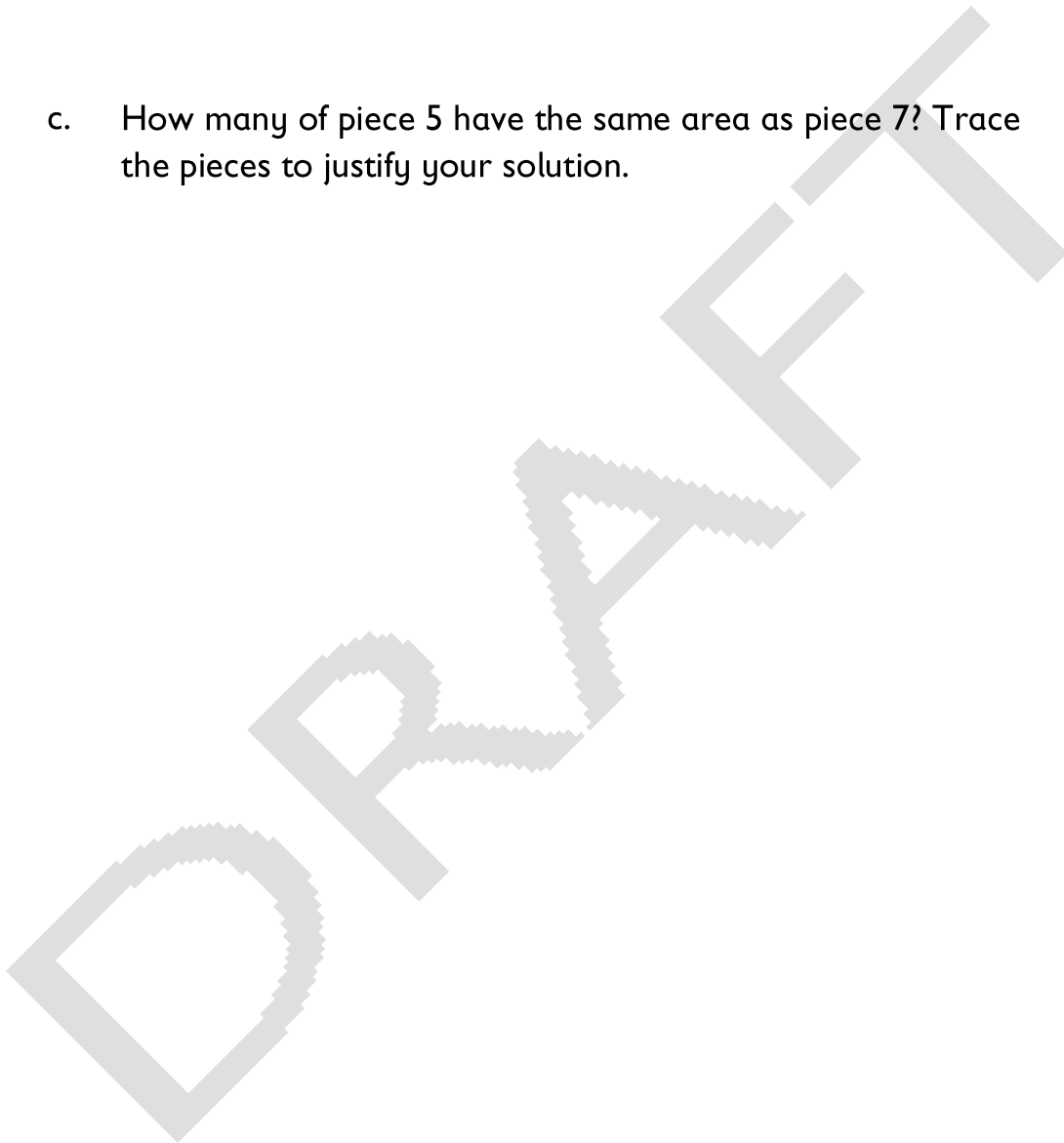
(1)

- b. How many of piece 5 have the same area as piece 1? Trace the pieces to justify your solution.

(2)

- c. How many of piece 5 have the same area as piece 7? Trace the pieces to justify your solution.

(2)



Project: How far does a ball roll?

(NumberSense Workbook 15, pages 57 – 61)

Project description

Classwork

- Your teacher will assign you to a group to complete this project.
- As a group you will first complete the research activity in NumberSense Workbook 15, pages 57 – 61 as a class activity.

Project

- Working in the same group you will repeat the research for a ping pong and another ball (pages 61 and 62 of the workbook)
- As a group you will hand in a poster clearly describing what you did during each stage of the data handling cycle.
- Your group will also make a presentation about the poster. Each member of the group must contribute to the presentation.
- This project is for 30 marks and will be marked it using the rubric provided.
- This project is due on _____

Poster content

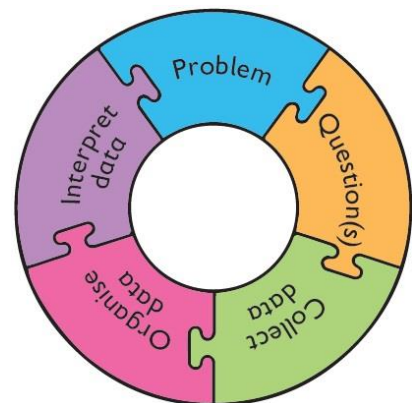
Your poster should be organised according to the different stages of the data handling cycle

1. Define the problem (page 61 question 1)

A clear statement of the question you want to answer by collecting the data.

2. Describe the research question(s) (page 61 question 1).

A clear statement of the question(s) you want to answer by collecting data. Questions are different to a problem statement. The question(s) in the case of this project are about the role of the different variables (e.g. material used for the slide; height of the slide; type of ball etc.) in solving the problem.



3. Collecting the data (page 62 question 2).

A detailed description of how you collected the data, including how you took care to ensure that the data you collected was reliable.

4. Organising the data (page 62 question 3).

A table with all of the data that you collected.

A discussion of whose approach you used to summarise your data: Casey's method or Vusi's method (Workbook 15, page 59) and why you decided to use that method.

A graph for each ball.

5. Interpret the data (page 62 question 4).

A discussion of what you learnt about the two balls by completing your research. The discussion should clearly demonstrate how you reached your conclusions based on the data you collected.

6. Reflection on completing the project.

A critical reflection on how you completed the activity. For example: What worked well? What did not work well? What could we have done better?

Names of group members: _____

Problem statement and research question	<p>3</p> <p>The statement and question are clearly stated and relevant to the required task.</p>	<p>2</p> <p>The statement and question are either well stated or relevant to the required task but not both.</p>	<p>1 0</p> <p>The statement and question are neither well stated nor relevant to the required task.</p>	[3]
Data collection	<p>6 5</p> <p>An appropriate amount of data has been collected using methods that are suited to the question and there is evidence that care was taken in setting up the experiment.</p>	<p>4 3</p> <p>Data has been collected using methods that are suited to the question, either the amount of data was insufficient or there was little evidence that care was taken in setting up the experiment.</p>	<p>2 1 0</p> <p>Data was collected, the methods were not suitable and/or the amount was insufficient</p>	[6]
Data organisation	<p>9 8 7</p> <p>The data has been efficiently summarised (e.g. tables), appropriate summary statistics (e.g. Casey's method and/or Vusi's method) have been determined; and suitably represented (e.g. graph).</p>	<p>6 5 4</p> <p>The data has been efficiently summarised (e.g. tables), appropriate summary statistics (e.g. Casey's method and/or Vusi's method) have been determined; and suitably represented (e.g. graph), however one or more of these elements either has errors or is not appropriate to the question being investigated.</p>	<p>3 2 1 0</p> <p>An incomplete attempt has been made to summarise (e.g. tables), determine summary statistics and represent (e.g. graph or table) the data.</p>	[9]
Data interpretation	<p>3</p> <p>There is clear evidence that the answer to the question is based on a sound interpretation of the data and not influenced by preconceived ideas or perceptions.</p>	<p>2</p> <p>The interpretation is supported by evidence in the data although there is also of the researcher's opinion influencing the answer.</p>	<p>1 0</p> <p>The interpretation is not supported by evidence in the data.</p>	[3]

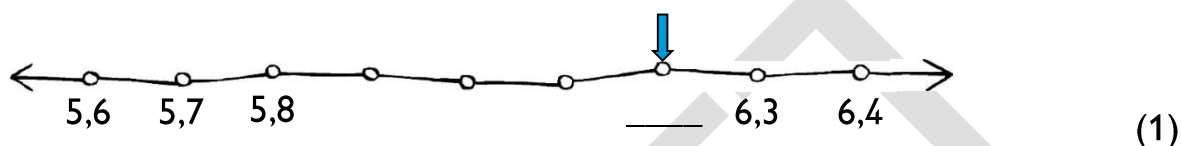
Reflection	<p>6 5</p> <p>A thorough thoughtful reflection that examines both strengths and weaknesses of the study has been clearly set out.</p>	<p>4 3</p> <p>There is a reflection that attempts to identify both strengths and weaknesses in the research.</p>	<p>2 1 0</p> <p>Little or no attempt has been made to reflect on the research.</p>	[6]
Presentation	<p>3</p> <p>The research has been clearly and efficiently presented, it is easy to follow the story.</p>	<p>2</p> <p>The research has been presented, the presentation either lacks clarity or efficiency.</p>	<p>1 0</p> <p>The research has been presented, the presentation is incomplete or lacks coherence.</p>	[3]
TOTAL				[30]

Name: _____

Class: _____

- Complete all answers on this question paper.
- Calculators may not be used.
- You will need a ruler marked in centimetres and millimetres to complete this assessment.

1. Determine the value indicated by the arrow.



2. a. Write $\frac{7}{10}$ as a decimal fraction. _____ (1)

b. Write 0,9 as a common fraction. _____ (1)

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

a. $0,3 + 0,3 =$ _____ (1)

b. $500 - 270 =$ _____ (1)

c. $7 - \frac{1}{7} =$ _____ (1)

d. $8,5 +$ _____ $= 9,2$ (1)

e. Double 245 = _____ (1)

f. $6 \times 4 =$ _____ (1)

4. Calculate and show your thinking.

$$17 \times 8$$

(2)

5. Suzi sells her bicycle for R12 000. She saves 1-third of her earnings. How much does she save?

R_____ (1)

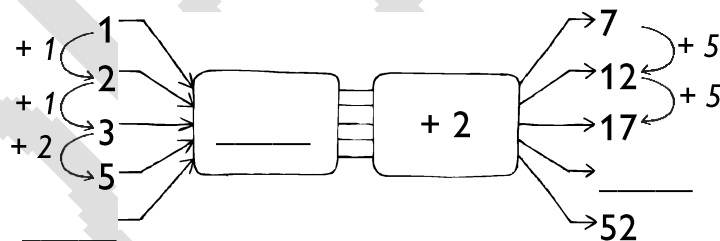
6. Cakes are cut into sixths or twelfths. Mrs Manga bought 4 sixths of a cake. How many twelfths should Mrs Singh buy to have as much cake as Mrs Manga?

_____ twelfths of cake (1)

7. 120 litres of milk is stored in a vat. How many 1,5 litre bottles can be filled from this vat? Show your thinking.

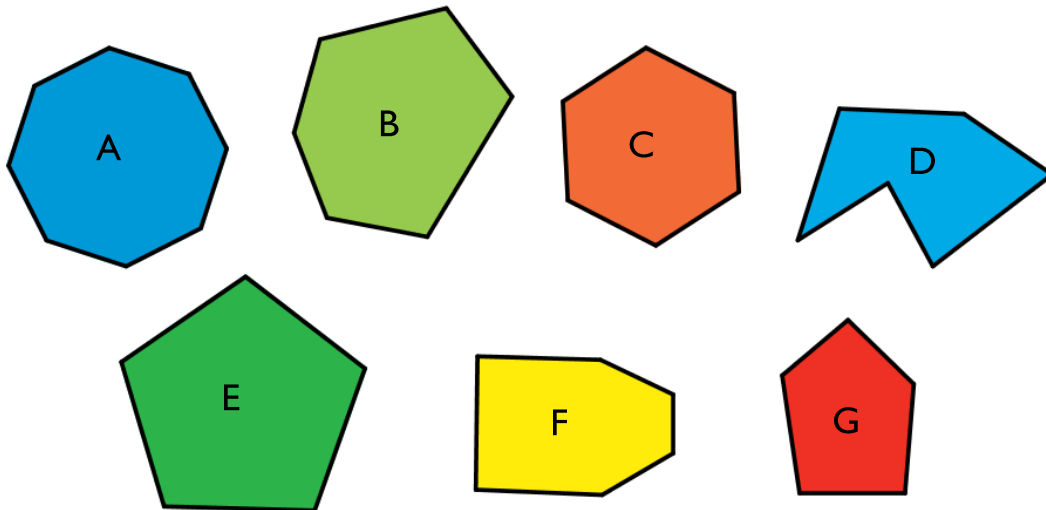
_____ bottles (2)

8. Complete.



(3)

9.



a. Select all the hexagon(s).

☐ A☐ B☐ C☐ D☐ E☐ F☐ G

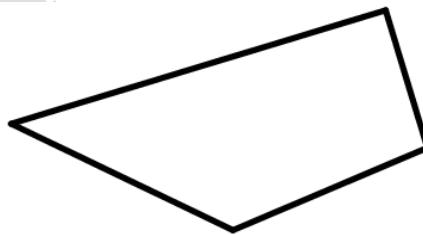
(1)

b. Select all the regular pentagon(s).

☐ A☐ B☐ C☐ D☐ E☐ F☐ G

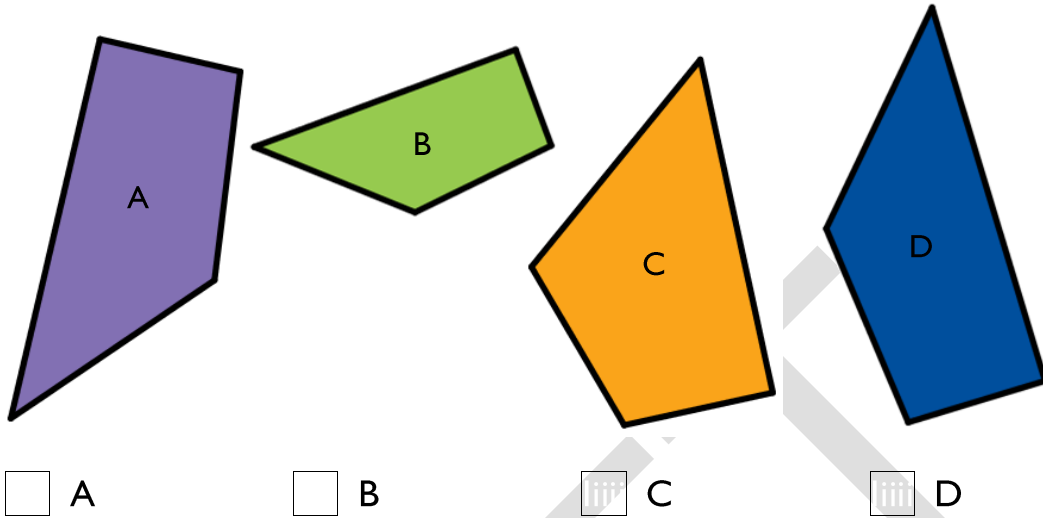
(1)

10. Lerato drew this quadrilateral:



a. Mark the right angle in Lerato's quadrilateral with a star (★) (1)

- b. Which of these shapes are the same as Lerato's quadrilateral?
Select all that apply.



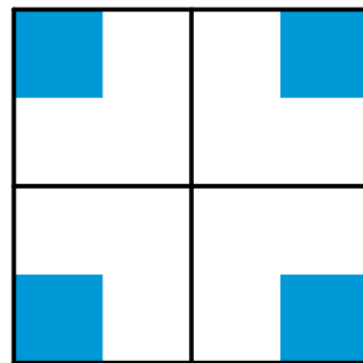
(1)

- c. Lerato claims that the length of the sides of her quadrilateral are: 8 cm, 6 cm, 3 cm and 2 cm. Explain how you know that Lerato is incorrect without using a ruler to measure the length of the sides.

(2)

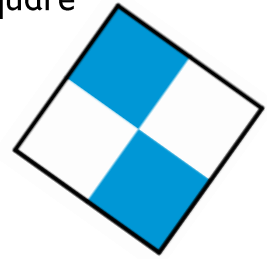
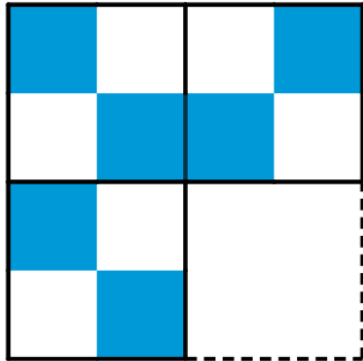
11. Megan uses square tiles to make squares with symmetry.

- a. Draw all the lines of symmetry on this square.



(1)

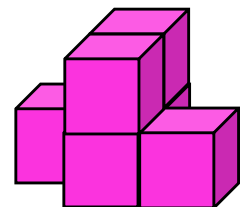
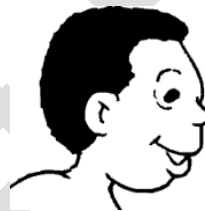
- b. Show how Megan should use the last tile to make a square that has exactly one line of symmetry. Draw the tile onto the square and draw the line of symmetry.



(2)

12. This boy is looking at the arrangement of blocks.

Draw the view that the boy sees.



(2)

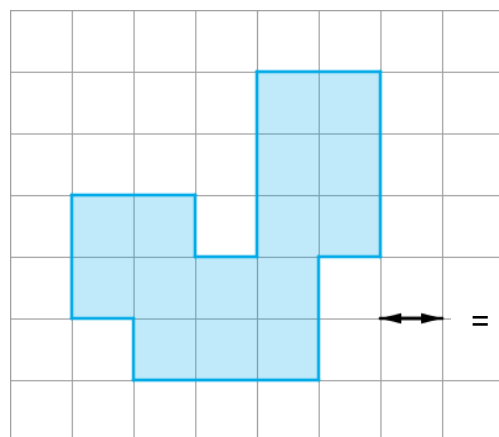
13. Use a ruler to measure the length of the line.



Complete. _____ cm + _____ mm (2)

14. Determine the perimeter of the shape.

Perimeter = _____ units



(1)

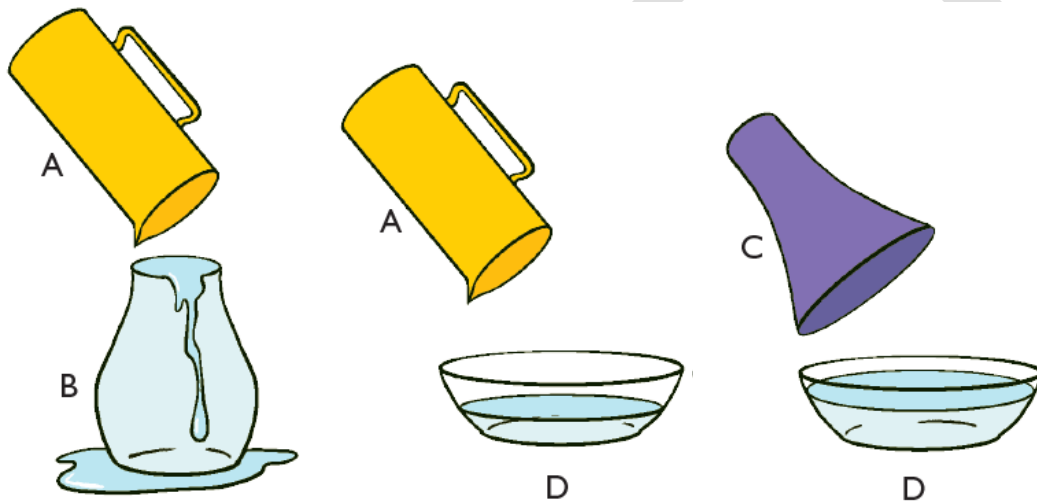
15. $1\ 000\text{ ml} = 1\text{ l}$

Janet buys 2 l of milk.

a. How many millilitres of milk is this? _____ ml (1)

b. Janet uses 250 ml of milk to make a batch of scones. How many batches of scones can she make?
_____ ml (1)

16. Arrange the containers from the one that holds the least water to the one that holds the most water.



_____ (1)

PART A

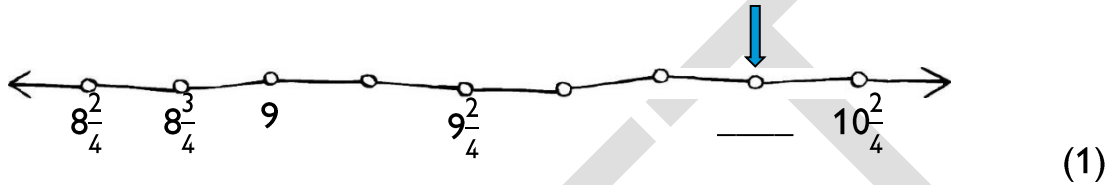
Name: _____

Class: _____

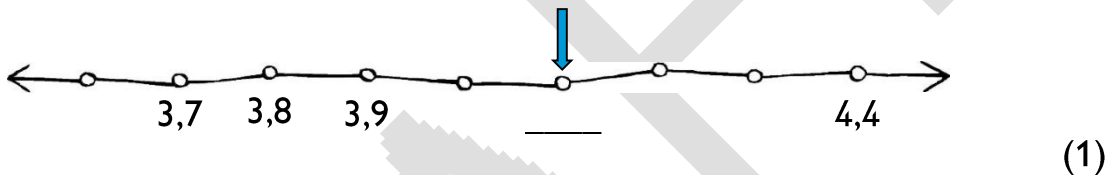
- Complete all answers on this question paper.
- Calculators may not be used.

1. Determine the values indicated by the arrows.

a.



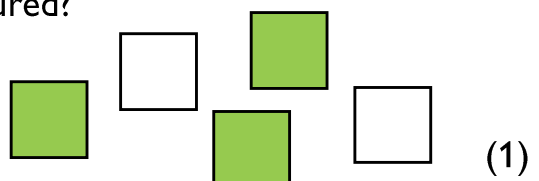
b.



2. Complete the pattern.

2,2 ; 2,4 ; 2,6 ; _____ ; _____ ; _____ ; 3,4 (1)

3. What fraction of all the squares are coloured?



4. Write the common fractions as equivalent decimal fractions.

a. $\frac{9}{10} =$ _____ (1)

b. $\frac{2}{5} =$ _____ (1)

5. Complete. Fill in the answer only.

a. $3\,000 - 100 =$ _____ (1)

b. $\frac{3}{7} - \frac{1}{7} =$ _____ (1)

c. $52 + 36 =$ _____ (1)

d. $2,4 + 0,6 =$ _____ (1)

e. $12,7 +$ _____ $= 13,2$ (1)

f. $1\frac{4}{9} +$ _____ $= 2$ (1)

g. Double 380 = _____

h. $7 \times 5 =$ _____ (1)

i. $600 \times 8 =$ _____ (1)

j. $24 \div 4 =$ _____ (1)

k. $800 \div 2 =$ _____ (1)

l. $2\,700 \div 900 =$ _____ (1)

m. $\frac{4}{7}$ of 21 = _____ (1)

6. Calculate. Show your thinking.

a. 23×54 (2)

b. $276 \div 3$ (2)

7. Four friends share half a cake equally. How much of the whole cake does each friend eat? Show your thinking.

_____ of the whole cake (2)

8. Mrs Van uses $\frac{4}{5}$ cup of raisins to make a loaf of bread. How many loaves can she make if she has 8 cups of raisins? Show your thinking.

_____ loaves (2)

9. Jack mixes 3 litres of yellow paint with 2 litres of blue paint to make green paint. How much yellow paint should he use if he wants to make 15 litres of green paint? Show your thinking.

_____ litres (2)

10. Calculate.

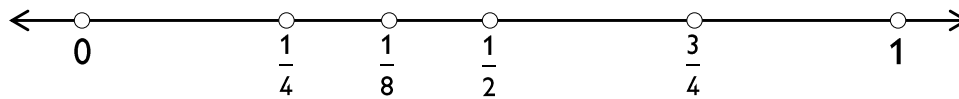
a. $\frac{1}{6}$ of 30 (1)

b. $\frac{1}{3}$ of 30 (1)

c. $\frac{1}{6} + \frac{1}{3}$. Show your thinking.

(2)

11. Which fraction on the number line is in the INCORRECT place?



_____ (1)

12. A two-digit number is less than 50. The sum of the two digits is 12 and the difference between the digits is 4. What is the number?

_____ (1)

13. A shop sells potatoes in big bags with 40 potatoes for R35,60. If they want to sell smaller bags of 15 potatoes for the same price, what should the price of the smaller bag be? Show your thinking.

R_____ (3)

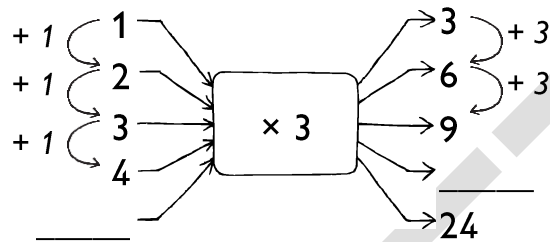
PART B

Name: _____

Class: _____

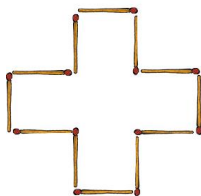
- Complete all answers on this question paper.
- Calculators may not be used.

14. Complete.

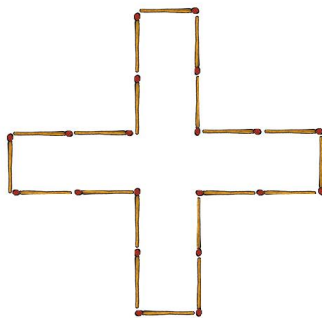


(2)

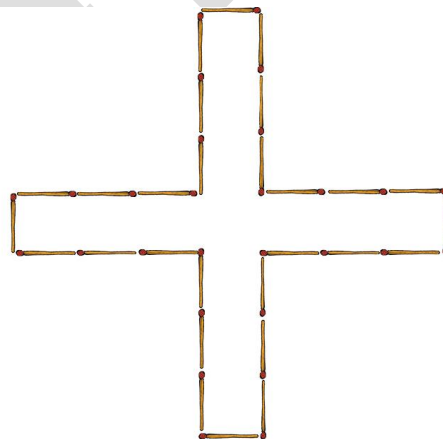
15. Vusi makes pictures with matches like this. The first three pictures make a pattern.



Picture 1



Picture 2



Picture 3

a. Complete the table for the number of matches in each picture.

Picture number	1	2	3	4	5
Number of matches	12				

(2)

- b. How many matches will there be in picture 10? Explain your thinking.

_____ matches (2)

- c. Which picture will use exactly 124 matches? Explain your thinking.

Picture _____ (2)

16. Thabo makes pictures with dots like this. The first four pictures make a pattern.

Picture 1

Picture 2

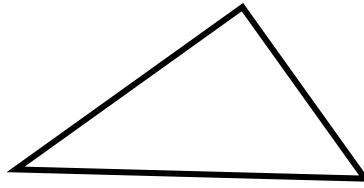
Picture 3

Picture 4

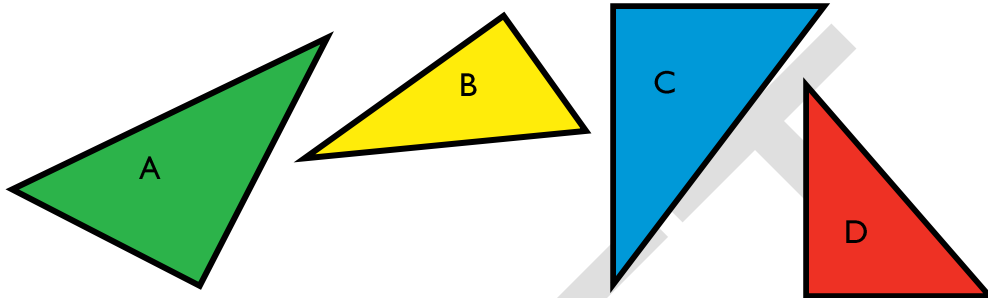
How many dots will there be in picture 8? Explain your thinking.

_____ dots (2)

17. Palesa drew this triangle:



- a. Which of these shapes are the same as Palesa's triangle?
Select all that apply.


☐ A

☐ B

☒ C

☐ D

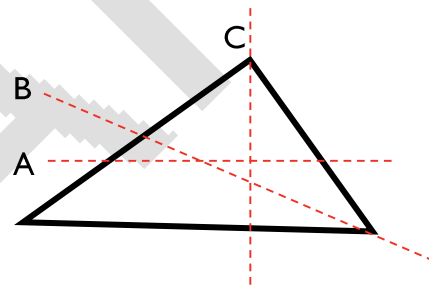
(1)

- b. Which lines drawn on Palesa's triangle are lines of symmetry?
Select all that apply.

☐ A

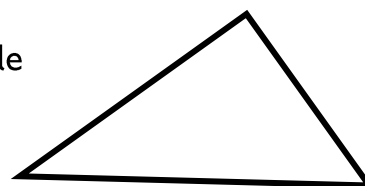
☐ B

☐ C

☒ No lines of symmetry


(1)

- c. Mark the right angle in Palesa's triangle with a star (*).

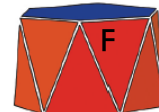
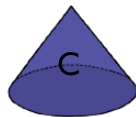
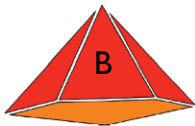


(1)

- d. Palesa claims that the length of the sides of her triangle are: 7 cm, 4 cm and 2 cm. Explain how you know that Palesa is incorrect without using a ruler to measure the length of the sides.

(2)

18. Which of the 3D objects below are pyramids? Select all that apply.


☐ A

☐ B

☐ C

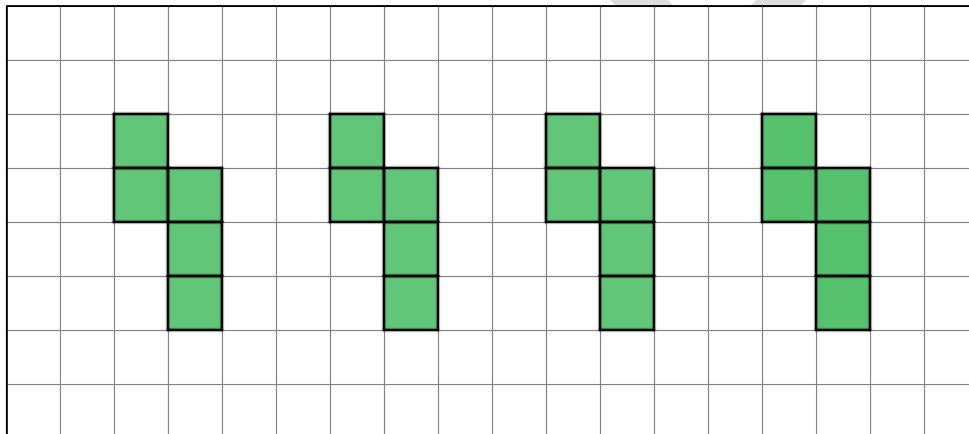
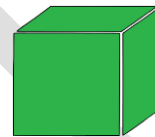
☐ D

☐ E

☐ F

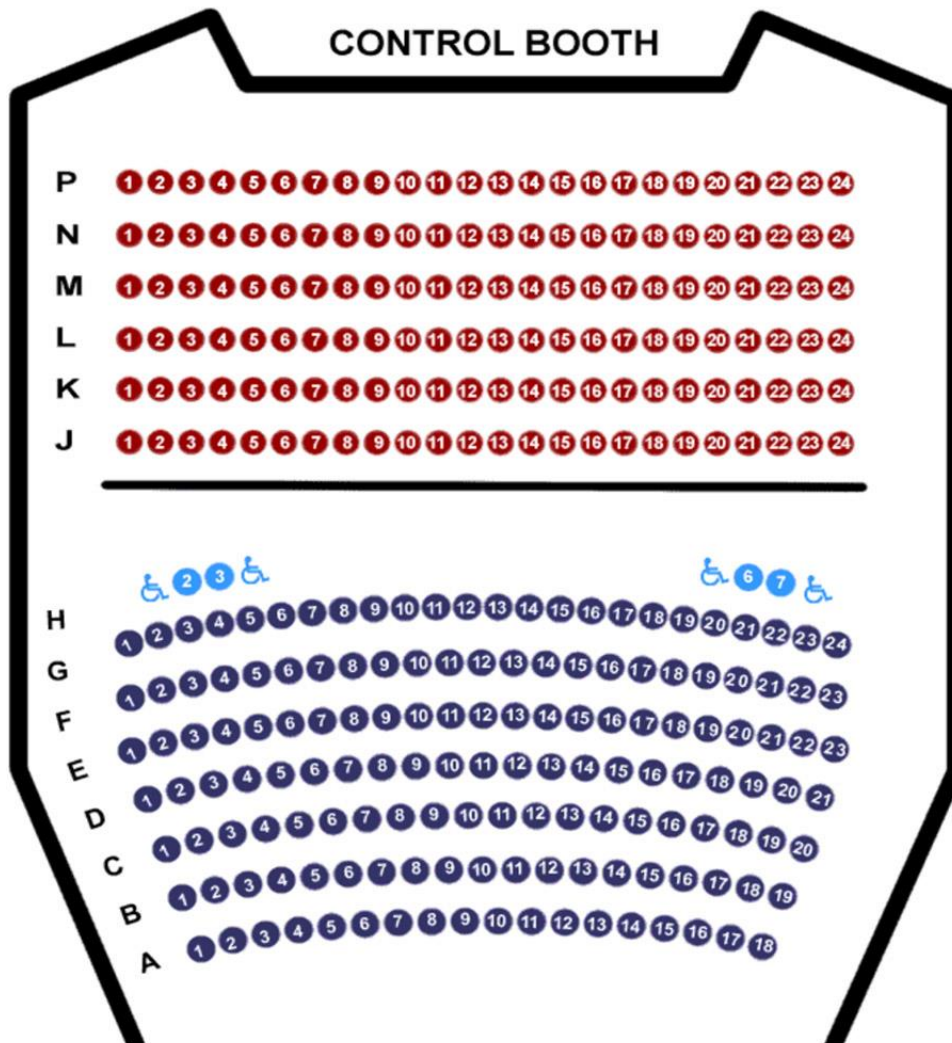
(1)

19. The images show incomplete nets that can be folded to make a cube. Draw the missing face in a different position on each of the nets.



(2)

20. Study the seating plan.



Stage

- Marc is sitting in seat E9. Mark his seat on the plan with an X. (1)
- Jarod is sitting in seat L20. How many rows from the back is Jarod sitting? _____ rows (1)

21. What time is being shown on this watch in the evening? Select all that apply.

☐ 25 minutes to 7 pm

☐ 7 minutes to 7 pm

☐ 7:35 pm

☐ 6:35 pm

☐ 07:35

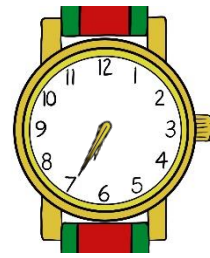
☐ 18:35

☐ 19:35

☐ 07:07

☒ 18:07

(2)



22. What is the most likely weight (mass) of a bar of soap? Tick the best option.

☐ 120 g

☐ 4 120 kg

☐ 10 g

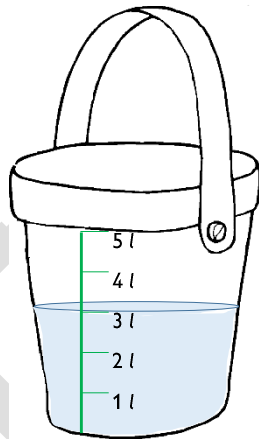
☐ 120 m

(1)



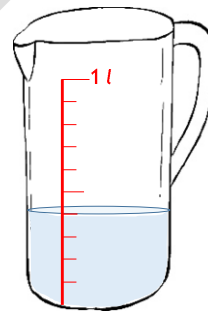
23. What volume of liquid is in each container?

a.



_____ l

b.



_____ ml (2)

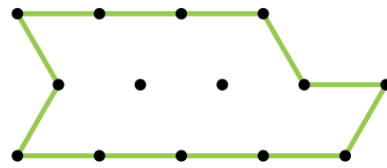
24. Abdul and Jan cover a shape with bottle-tops to determine the area of the shape. Abdul covered the shape with 18 bottle-tops. Jan covered the shape with 32 bottle-tops.

Who used the larger bottle-tops, Abdul or Jan? Explain.

(2)

25. How many small triangle tiles are needed to cover the other shape exactly?

_____ triangles

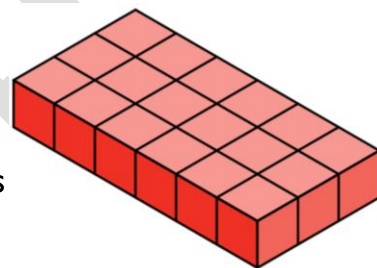


(1)

26. Rob builds layers of cubes like this:

- a. How many cubes are in a layer?

_____ cubes



(1)

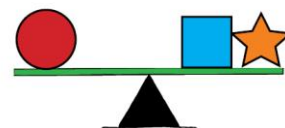
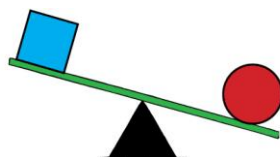
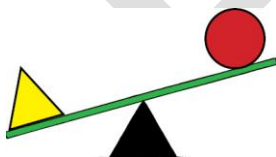
- b. How many cubes would there be in an arrangement 10 layers high?

_____ cubes

(1)

27. Using the scales illustrated, determine which is heavier,

▲ or ★ ? Explain.



☐ ▲ is heavier

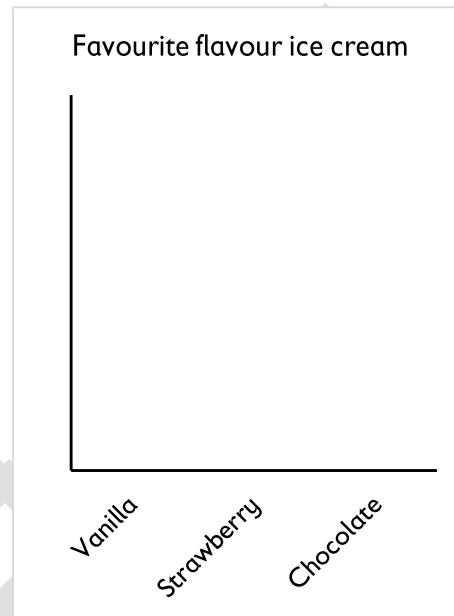
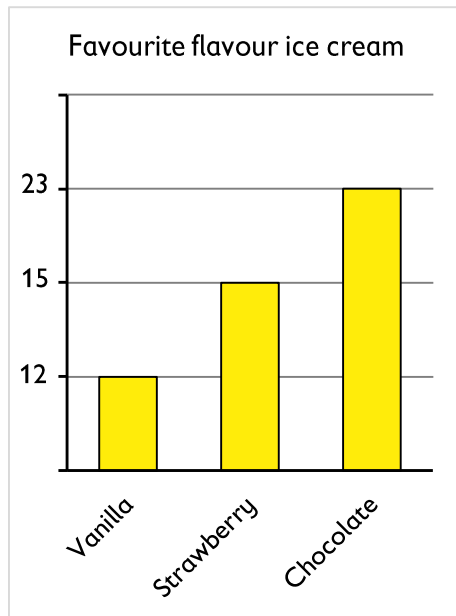
☐ ★ is heavier

Because:

(2)

28. Vusi asked children at his school what their favourite flavour of ice cream was. He recorded their answers in a table and then drew this graph.

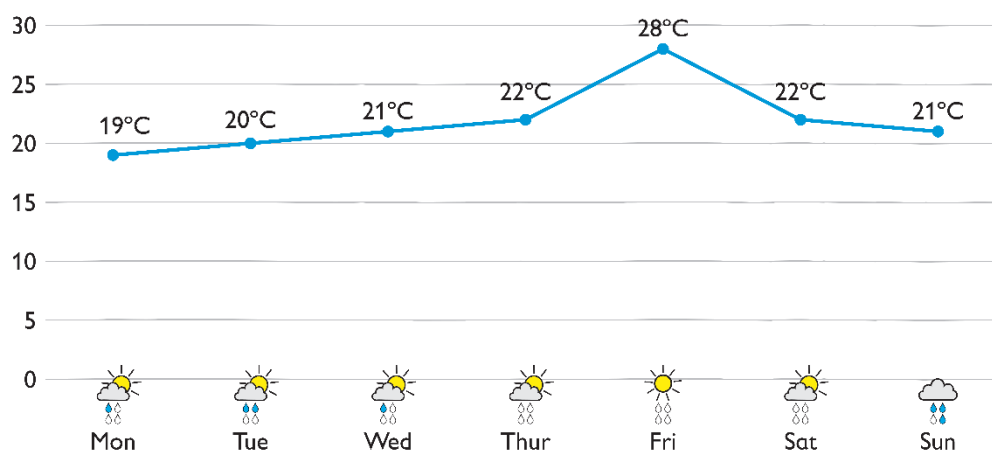
Flavour	Number of children
Vanilla	12
Strawberry	15
Chocolate	23



Explain why Reece's graph is incorrect and draw the correct graph.

(2)

29. Study the weekly weather prediction chart for Cape Town.



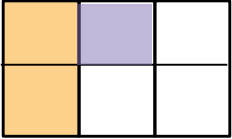
- a. On which day is the week is it likely to be the hottest?
(1)
- b. On which day of the week is it most likely to rain?
(1)
- c. Will it rain on Tuesday? Explain.
(1)

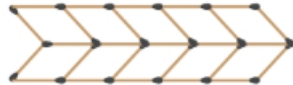
DRAFT

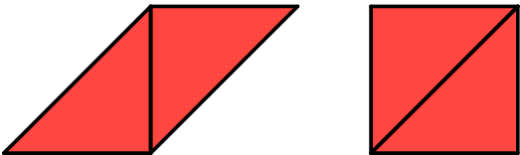
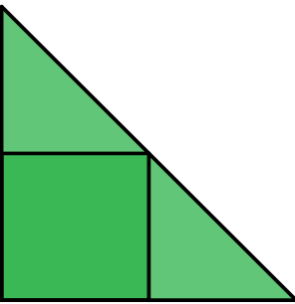
To prepare for this assessment, learners should have completed NumberSense Workbook 16 , pages 1 – 36.

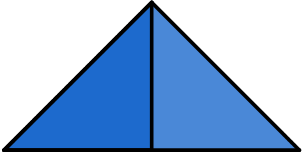
Memo:

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
1.	$210 \div 24 + 81 \div 24$	1 mrk: correct	NOR	16.25	R	(1)
2.	<p>91</p> <p><i>Possible thinking:</i></p> <ul style="list-style-type: none"> $637 = 630 + 7$. $630 \div 7 = 90$ and $7 \div 7 = 1$. $90 + 1 = 91$ $70(10) + 70(10) \rightarrow 140 + 140(20) \rightarrow 280 + 280(40) \rightarrow 560 + 70(10) \rightarrow 630 + 7(1) \rightarrow 637$ $10 + 10 + 20 + 40 + 10 + 1 = 91$ 	<p>1 mrk: correct</p> <p>1 mrk: valid thinking</p>	NOR	16.25	A	(2)
3.	<p>2</p> <p><i>Possible thinking:</i></p> <ul style="list-style-type: none"> $6 \times 10 = 60$ and $6 \times 5 = 30$. $100 - 60 - 30 = 10$. $10 - 6 = 4$. $4 + 2 = 6$ 6; 12; 18; 24; 36; 42; 48; 54; 60; 66; 72; 78; 84; 90; 96; 102 and $102 - 100 = 2$ 	<p>1 mrk: correct</p> <p>1 mrk: valid thinking</p>	NOR	16.25; 16.36	R	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
4.	$10\frac{2}{3}$ or 10 and 2-thirds <i>Possible thinking:</i> <ul style="list-style-type: none"> $6 \div 3 = 2$ milkstarts and $8 \div 3 = 8$-thirds. 8-thirds $\times 4 = 32$-thirds. There are 3-thirds in 1, so 32-thirds = 10 and 2-thirds 	1 mrk: correct 1 mrk: valid thinking <i>Accept fractions equivalent to $\frac{2}{3}$</i>	NOR	16.9	R	(2)
5.	$\frac{1}{2}$ or 1-half <i>Possible thinking:</i> <ul style="list-style-type: none"> Suppose there are 12 strawberries. $\frac{1}{3}$ of 12 = 4 and $\frac{1}{6}$ of 12 = 2. 6 out of 12 strawberries = $\frac{1}{2}$ 	1 mrk: correct 1 mrk: valid thinking <i>Accept fractions equivalent to $\frac{1}{2}$</i>	NOR	16.3	R	(2)
6.	29 <i>Possible thinking:</i> <ul style="list-style-type: none"> $15 + 6,75 = 21,75$. $\frac{1}{4}$ of the money that he needs = $21,75 \div 3 = 7,25$. $7,25 \times 4 = 29$ 	1 mrk: 21,75 1 mrk: evidence of $\div 3$ 1 mrk: correct, i.e. 29	NOR	16.3	R	(3)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation																
7.a.		1 mrk: correct	PFA	16.8; 16.32	A	(1)																
7.b.	<table><tr><td>Pic. no.</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>10</td><td>20</td></tr><tr><td>No. of matches</td><td>7</td><td>12</td><td>17</td><td>22</td><td>27</td><td>52</td><td>102</td></tr></table>	Pic. no.	1	2	3	4	5	10	20	No. of matches	7	12	17	22	27	52	102	1 mrk: 22 and 27 1 mrk: 52 1 mrk: 102	PFA	16.8; 16.32	A	(3)
Pic. no.	1	2	3	4	5	10	20															
No. of matches	7	12	17	22	27	52	102															
7.c.	Picture number $\rightarrow \times 5 \rightarrow + 2 \rightarrow$ No. of matchsticks	1 mrk: $\times 5$ 1 mrk: $+2$ <i>Marks should only be awarded if in the correct order</i>	PFA	16.32	A	(2)																
7.d.	16 <i>Possible thinking:</i> <ul style="list-style-type: none">$82 - 2 \rightarrow 80 \div 5 \rightarrow 16$	1 mrk: correct 1 mrk: valid thinking	PFA		R	(2)																

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
8.a.	<p><i>Trace the shapes to show that piece 3 and 4 make piece 5 and they make piece 6.</i></p> 	1 mrk: correct	M	16.42; 16.43	A	
8.b.	<p>The area of $2 \times \text{Piece 5} = \text{Piece 1}$, because the area of Piece 3 + Piece 4 = Piece 5</p> 	<p>1 mrk: valid illustration</p> <p>1 mrk: correct explanation</p>	M	16.42; 16.43	A	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
8.c.	<p>The area of $1 \times \text{Piece 5} = \text{Piece 7}$, because the area of Piece 3 + Piece 4 = Piece 5</p> 	<p>1 mrk: valid illustration</p> <p>1 mrk: correct explanation</p>	M	16.42; 16.43	A	(2)

Before completing this project, learners should have worked through NumberSense Workbook 15, pages 57 to 61. Teachers should have discussed the investigation on these pages with the learners.

Because learners are collecting data, this project is not marked with a traditional memorandum. This project should be marked using the rubric supplied to the learners.

Learners are required to present their findings to the class. They should use a poster to do so. This could also be presented using a Powerpoint presentation or a video depending on what resources are available to the learners and in the classroom. The focus of time should be spent on the collecting and analysing of data and marks are therefore weighted accordingly.

We have provided an example of how we expect learners to complete this project and provided notes for clarification to the rubric.

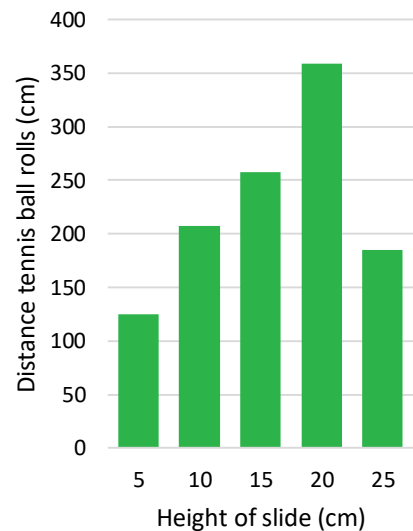
Example of Learner Project:

<p>Problem Statement: How far will a tennis ball roll?</p> <p>Research question: At what height should we roll a tennis ball down a slide to get it to roll as far as possible?</p> <p>Collecting data: We used our 30cm cardboard slide and rested it at heights of 5cm intervals. At each height, we rolled a tennis ball 15 times and recorded the height that it rolled in a table. We used Busi's dad's measuring tape to measure the distance and rolled the ball along an open tiled floor.</p>															
Height of slide	Distance rolled (cm)														
5 cm	65	136	130	102	78	137	81	132	85	136	125	133	135	89	74
10 cm	202	278	169	207	203	210	170	256	225	185	264	208	191	253	200
15 cm	230	271	252	238	268	266	252	269	249	250	267	258	267	249	270
20 cm	329	360	374	367	345	351	342	366	332	364	370	359	338	360	349
25 cm	200	180	192	170	185	188	201	200	185	192	187	174	184	177	204
<p>Organising data: We felt that because so much of the data was repeated, Cassey's method of using the distance that the ball rolled most often was well suited to our data. OR We used Vusi's method of finding the middle distance to represent our data as the distances did not always have only one value that occurred a lot more often than others.</p>															

We represented these distances at each height interval on the graph.

Interpreting the data and conclusion: The tennis ball rolled the furthest when it was rolled from the slide placed 20 cm above the ground. Placing the slide higher made the ball bounce, not roll and it didn't seem to go as far.

Reflection: We had to be careful to clear the tiled floor in front of the slide as any resistance slowed the ball down and gave us a different result. We have done this investigation with marbles, ping-pong balls and now tennis balls. We think it may be interesting to build a bigger, longer slide and try this experiment with a soccer ball.



Discussion of rubric:

Problem statement and research question	3 The statement and question are clearly stated and relevant to the required task.	2 The statement and question are either well stated or relevant to the required task but not both.	1 0 The statement and question are neither well stated nor relevant to the required task.	[3]
Both the problem statement and research question should be provided by the learners on their poster. They should be brief and simple and relevant to the task set.				
Data collection	6 5 An appropriate amount of data has been collected using methods that are suited to the question and there is evidence that care was taken in setting up the experiment.	4 3 Data has been collected using methods that are suited to the question, either the amount of data was insufficient or there was little evidence that care was taken in setting up the experiment.	2 1 0 Data was collected, the methods were not suitable and/or the amount was insufficient	[6]
Learners should provide a brief explanation of how their data was collected, showing some evidence that they have thought through factors that could affect the data collection. They could add photos to their poster or presentation.				
Learners should also show that they have collected enough data. Only rolling the ball once at each height level is not acceptable. We would recommend a minimum of 7 rolls at each height level. The number of times the ball is rolled does not have to be an odd number, but this does make it easier if they choose to determine the middle value (median) of their data.				

Data organisation	9 8 7 The data has been efficiently summarised (e.g. tables), appropriate summary statistics (e.g. Casey's method and/or Vusi's method) have been determined; and suitably represented (e.g. graph).	6 5 4 The data has been efficiently summarised (e.g. tables), appropriate summary statistics (e.g. Casey's method and/or Vusi's method) have been determined; and suitably represented (e.g. graph), however one or more of these elements either has errors or is not appropriate to the question being investigated.	3 2 1 0 An incomplete attempt has been made to summarise (e.g. tables), determine summary statistics and represent (e.g. graph or table) the data.	[9]
Learners have not learned any measures of central tendency (averages) at this stage to summarise their data. They have, however been introduced to Casey and Vusi's methods (see Wkbk 15, p. 59) which will one day become mode and median. Learners should justify why they chose the distance that they did to represent each height and provide a well-labelled graph.				
Data interpretation	3 There is clear evidence that the answer to the question is based on a sound interpretation of the data and not influenced by preconceived ideas or perceptions.	2 The interpretation is supported by evidence in the data although there is also of the researcher's opinion influencing the answer.	1 0 The interpretation is not supported by evidence in the data.	[3]
Learners interpretation should answer the research question. Essentially, it should articulate what is shown in the graph, i.e. that the height to roll a ball from is x cm to ensure that the ball rolls as far as possible.				
Reflection	6 5 A thorough thoughtful reflection that examines both strengths and weaknesses of the study has been clearly set out.	4 3 There is a reflection that attempts to identify both strengths and weaknesses in the research.	2 1 0 Little or no attempt has been made to reflect on the research.	[6]
In this section, learners should provide evidence that they have thought carefully about what could go wrong or provide false data in their experiment.				

Presentation	3 The research has been clearly and efficiently presented, it is easy to follow the story.	2 The research has been presented, the presentation either lacks clarity or efficiency.	1 0 The research has been presented, the presentation is incomplete or lacks coherence.	[3]
These marks are awarded for the neatness, creativity, and attractiveness of the presentation.				
TOTAL				[30]

DRAFT

To prepare for this assessment, learners should revise from NumberSense Workbook 14, pages 29 – 36 and pages 50 – 64 (3D views and length) as well as Workbook 15, pages 1 – 23 and pages 38 – 54 (Space & Shape and volume).

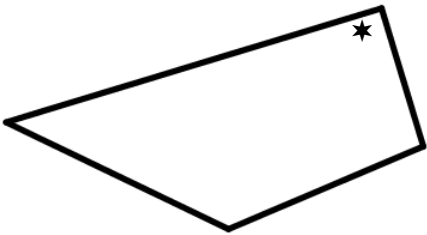
Assessment framework:		Cognitive domain						
		Knowing (K)		Applying (A)		Reasoning (R)		TOTAL
Content area	Number, operations and relationships (NOR)	1(1), 2(2), 3a(1), 3b(1); 3e(1); 3f(1); 6a(1), 6b(1)	7	3c(1), 3d(1), 4(2), 5(1)	5	6(1), 7(2)	3	15
	Patterns, functions & algebra (PFA)			8(3)	3			3
	Space & shape (SS)	9(2), 10a(1), 11a(1)	4	10b(1), 10c(2), 12(2)	5	11b(2)	2	11
	Measurement (M)	13(2), 15a(1)	3	14(1), 15b(1)	2	16(1)	1	6
	Data handling (DH)							
	TOTAL	14		15		6		35

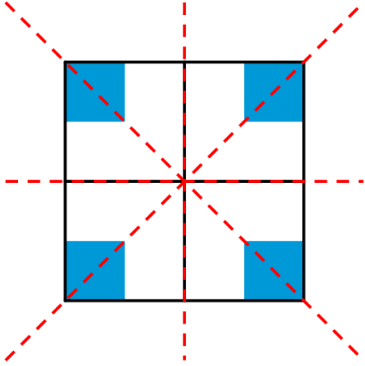
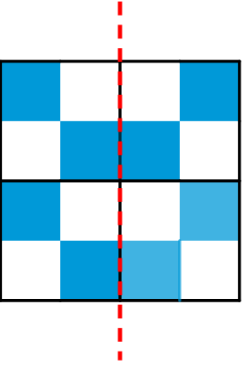
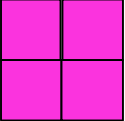
Memo:

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
1.	6,2	1 mrk: correct	NOR	14.25; 15.4; 15.13; 15.19	K	(1)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
2.a.	0,7	1 mrk: correct	NOR	14.24;	K	(1)
2.b.	$\frac{9}{10}$	1 mrk: correct	NOR	14.29; 15.10; 15.19	K	(1)
3.a.	0,6	1 mrk: correct	NOR	15.4; 15.21; 15.22	K	(1)
3.b.	230	1 mrk: correct	NOR	15.2	K	(1)
3.c	$6\frac{6}{7}$	1 mrk: correct	NOR	15.4; 15.15	K	(1)
3.d.	0,7	1 mrk: correct	NOR	15.4; 15.10	A	(1)
3.e.	490	1 mrk: correct	NOR	15.2	K	(1)
3.f	24	1 mrk: correct	NOR	14.24; 15.14	K	(1)
4.	136 <i>Possible thinking:</i> <ul style="list-style-type: none"> $17 \times 2 \rightarrow 34 \times 2 \rightarrow 68 \times 2 \rightarrow 136$ $10 \times 8 = 80; 7 \times 8 = 56 \text{ and } 80 + 56 = 136$ 	2 mrks: correct or 1 mrk: correct working	NOR	15.14	A	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
5.	R4 000	1 mrk: correct	NOR	14.11; 14.22; 14.25; 14.29; 15.7; 15.11	A	(1)
6.	8	1 mrk: correct	NOR	15.11	R	(1)
7.	80 <i>Possible thinking:</i> <ul style="list-style-type: none"> $1,5 + 1,5 = 3$; $120 \div 3 = 40$ and $40 \times 2 = 80$ $1,5 + 1,5 \rightarrow 3 + 1,5 \rightarrow 4,5 + 1,5 \rightarrow 6 + 1,5 \rightarrow 7,5 + 1,5 \rightarrow 9 + 1,5 \rightarrow 10,5 + 1,5 \rightarrow 12$ so $1,5 \times 8 = 12$, then $1,5 \times 80 = 120$ 	2 mrks: correct or 1 mrk: correct working	NOR	15.4; 15.10; 15.21; 15.22; 15.31	R	(2)
8.		1 mrk: $\times 5$ 1 mrk: 10 1 mrk: 27	PFA	15.6; 15.9; 15.16	A	(3)
9.a	B, C, D and F	1 mrk: all 4 correct and no extra	SS	15.43; 15.46	K	(1)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
9.b	E	1 mrk: E only	SS	15.43; 15.44; 15.46	K	(1)
10.a		1 mrk: correct	SS	15.43; 14.45	K	(1)
10.b	A and D	1 mrk: BOTH correct and no extra	SS	15.40	A	(1)
10.c.	The sum of the 3 shorter sides (3 cm + 2 cm + 1 cm = 6 cm) is shorter than the length of the longest side (8 cm) so the sides won't close.	1 mrk: evidence of sum of shorter sides 1 mrk: evidence that the 3 shorter sides are less than longest side <i>This may be illustrated as a sketch.</i>	SS	15.38; 15.39	A	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
11.a.		1 mrk: all 4 lines of symmetry indicated an no extra lines	SS	15.41; 15.42	K	(1)
11.b.		1 mrk: correct orientation of missing tile 1 mrk: correct line of symmetry	SS	15.41; 15.42	R	(2)
12.		1 mrk: blocks are square shaped 1 mark: correct arrangement	SS	14.53; 14.54; 14.55	A	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
13.	10 cm + 6 mm	1 mrk: 10 cm 1 mrk: 6 mm (<i>Allow 2 mm difference</i>) <i>Please check student copies as printer settings may change the size slightly.</i>	M	14.57; 14.61; 14.63	K	(2)
14.	22	1 mrks: correct	M	14.63; 14.64	A	(1)
15.a.	2000	1 mrk: correct	M	15.51	K	(1)
15.b.	8	1 mrk: correct	M	15.51	A	(1)
16.	B, A, C, D	1 mrk: correct <i>1st image shows that A holds more than B.</i> <i>2nd image shows that D holds more than A</i> <i>3rd image shows that D holds more C, but C holds more than A because the height of water is higher than the 2nd image</i>	M	7.54	R	(1)

This examination covers all content from NumberSense Comprehensive Workbooks 13, 14, 15 and 16.

It is recommended that learners complete this examination over 2 days (preferably consecutive days) and that they have at least 1 hour to complete each part, i.e. 1 hour for Part A and 1 hour for Part B.

Assessment framework:

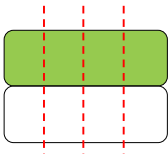
Assessment framework:		Cognitive domain						
		Knowing (K)		Applying (A)		Reasoning (R)		TOTAL
Content area	Number, operations and relationships (NOR)	1(2), 2(1), 3(1), 4a(1), 5a(1), 5b(1), 5c(1), 5d(1), 5f(1), 5g(1), 5h(1), 5j(1), 5k(1), 10a(1), 10b(1)	16	4b(1), 5e(1), 5i(1), 5l(1), 5m(1), 6(4), 7(2), 8(2), 9(2)	15	10c(2), 11(1), 12(1), 13(3)	7	38
	Patterns, functions & algebra (PFA)	14(2), 15a(2)	4	15b(2), 16(2)	4	15c(2)	2	10
	Space & shape (SS)	17b(1), 17c(1), 18(1), 20a(1)	4	17a(1), 17d(2), 20b(1)	4	19(2)	2	10
	Measurement (M)	21(2), 22(1), 23a(1), 26a(1)	5	23b(1), 24(2), 26b(1)	4	25(1), 27(2)	3	12
	Data handling (DH)	29a(1)	1	28(2), 29b(1)	3	29c(1)	1	5
	TOTAL	30		30		15		75

Part A Memo:

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
1.a.	$10\frac{1}{4}$	1 mrk: correct	NOR	16.12, 16.15	K	(1)
1.b.	4,1	1 mrk: correct	NOR	15.19; 16.1; 16.15	K	(1)
2.	2,8 ; 3 (or 3,0) ; 3,2	1 mrk: all correct	NOR	15.4; 16.1	K	(1)
3.	3 fifths or $\frac{3}{5}$	1 mrk: correct	NOR	13.11; 13.17; 16.29	K	(1)
4.a.	0,9	1 mrk: correct	NOR	14.24;	K	(1)
4.b.	0,4	1 mrk: correct	NOR	14.29; 15.10; 15.19; 16.15	A	(1)
5.a.	2900	1 mrk: correct	NOR	13.7; 13.38	K	(1)
5.b.	$\frac{2}{7}$	1 mrk: correct	NOR	16.12; 16.30	K	(1)
5.c.	88	1 mrk: correct	NOR	13.18	K	(1)
5.d.	3	1 mrk: correct	NOR		K	(1)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
5.e	0,5	1 mrk: correct	NOR	16.1; 16.6; 16.15	A	(1)
5.f.	$\frac{5}{9}$	1 mrk: correct	NOR	13.25; 13.29; 14.15; 14.16; 14.19; 15.1; 15.4	K	(1)
5.g.	740	1 mrk: correct	NOR	13.3; 13.5; 13.15	K	(1)
5.h.	35	1 mrk: correct	NOR	13.27; 16.2; 16.19	K	(1)
5.i.	4800	1 mrk: correct	NOR	16.4; 16.19	A	(1)
5.j.	6	1 mrk: correct	NOR	16.2; 16.5; 16.7	K	(1)
5.k.	400	1 mrk: correct	NOR	16.10; 16.16	K	(1)

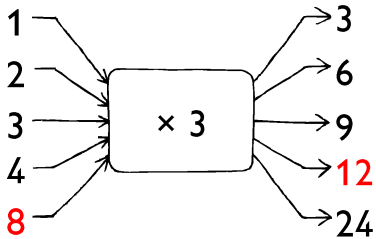
Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
5.l.	3	1 mrk: correct	NOR	16.16	A	(1)
5.m.	12	1 mrk: correct	NOR	14.11; 14.22; 14.25; 14.29; 15.7; 15.11; 16.6	A	(1)
6.a.	1242 <i>Possible thinking:</i> <ul style="list-style-type: none"> $54 = 50 + 4$ $23 \times 50 = \text{half } 2300 = 1150 \text{ and } 23 \times 4 = 46 \times 2 = 92$ $1150 + 92 = 1242$ 	2 mrks: correct or 1 mrk: correct working	NOR	13.4; 13.14; 14.31; 15.20; 15.29	A	(2)
6.b.	9 <i>Possible thinking:</i> <ul style="list-style-type: none"> $270 \div 3 = 90 \text{ and } 6 \div 3 = 2. 90 + 2 = 92$ $3 \times 100 = 300, 300 - 276 = 24; 3 \times 8 = 24; 100 - 8 = 92$ 	2 mrks: correct or 1 mrk: correct working	NOR	16.22	A	(2)

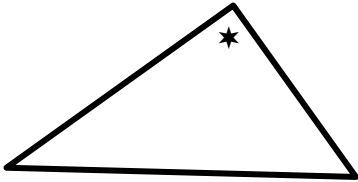
Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
7.	1 eighth or $\frac{1}{8}$ <i>Possible thinking:</i> 	1 mrk: correct 1 mrk: valid thinking	NOR	13.29	A	(2)
8.	10 <i>Possible thinking:</i> <ul style="list-style-type: none"> $\frac{4}{5} + \frac{4}{5} \rightarrow 1\frac{3}{5} + \frac{4}{5} \rightarrow 2\frac{2}{5} + \frac{4}{5} \rightarrow 3\frac{1}{5} + \frac{4}{5} \rightarrow 4$, so if she uses 4 cups to make 5 loaves, she will use 8 cups to make 10 loaves. There are 5-fifths in 1 cup, so 40-fifths in 8 cups. 40-fifths \div 4-fifths = 10 loaves 	2 mrks: correct or 1 mrk: correct working	NOR	13.23; 14.10; 14.13; 14.19; 14.25; 15.1; 15.7; 15.11	A	(2)

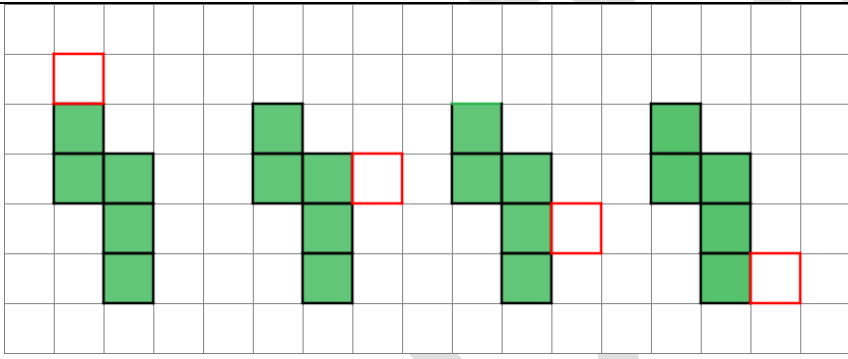
Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation												
9.	<p>9</p> <p>Possible thinking:</p> <ul style="list-style-type: none">Could use a table, for e.g. <table><tr><th>Yellow paint (L)</th><th>Blue paint (L)</th><th>Total (L)</th></tr><tr><td>3</td><td>2</td><td>5</td></tr><tr><td>6</td><td>4</td><td>10</td></tr><tr><td>9</td><td>6</td><td>15</td></tr></table> <ul style="list-style-type: none">Jack makes 5 litres each time. $15 \div 5 = 3$ lots of green paint. $3 \times 3 = 9$	Yellow paint (L)	Blue paint (L)	Total (L)	3	2	5	6	4	10	9	6	15	<p>2 mrks: correct</p> <p>or</p> <p>1 mrk: correct working</p>	NOR	14.13; 15.8	A	(2)
Yellow paint (L)	Blue paint (L)	Total (L)																
3	2	5																
6	4	10																
9	6	15																
10.a	5	1 mrk: correct	NOR	14.18;	K	(1)												
10.b.	10			16.3; 16.6; 16.21; 16.24; 16.29	K	(1)												
10.c.	<p>$\frac{15}{30}$</p> <p>Possible thinking:</p> <ul style="list-style-type: none">If $\frac{1}{6}$ of 30 = 5 and $\frac{1}{3}$ of 30 = 10, then $\left(\frac{1}{6} + \frac{1}{3}\right) = \frac{5}{30} + \frac{10}{30} = \frac{15}{30}$	<p>1 mrk: correct (accept fractions equivalent to $\frac{1}{2}$)</p> <p>1 mrk: valid working</p>	NOR	16.3	R	(2)												

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
11.	$\frac{1}{8}$	1 mrk: correct	NOR	16.15, 16.18	R	(1)
12.	48	1 mrk: correct	NOR		R	(1)
13.	<p>R13,35</p> <p><i>Possible thinking:</i></p> <ul style="list-style-type: none"> To divide R35,60 by 8, break R35,60 into R4, R3,20 and 40c: $R32 \div 8 = R4$; $R3,20 \div 8 = 40c$ and $40c \div 8 = 5c$. $R4 + 40c + 5c = R4,45$ To multiply $b=y$ 3: $R4 \times 3 = R12$ and $45c \times 3 = R1,35$. $R12 + R1,35 = R13,35$ To divide R35,60 by 40, divide by 10, halve and halve again: $R35,60 \div 10 = R3,56$; half $R3,56 = R1,50 + 28c$ and half $R1,50 + 28c = 75c + 14c = 89c$ To multiply by 15: $89c \times 15 = 890c + 445c = R13,35$ 	<p>1 mrk: evidence of dividing R35,60 by 40 or 8</p> <p>1 mrk: evidence of multiplying quotient by 15 or 3 C/A</p> <p>1 mrk: R13,35</p> <p><i>There may be other valid strategies that marks could be awarded for. Check all reasoning.</i></p>	NOR		R	(3)

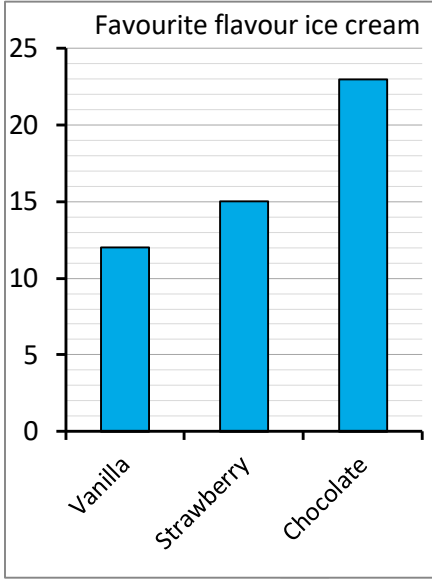
Part B Memo:

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation												
14.		1 mrk: 8 1 mrk: 12	PFA	15.6; 15.9; 15.16	K	(2)												
15.a.	<table border="1"><tr><td>Picture number</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Number of matches</td><td>12</td><td>20</td><td>28</td><td>36</td><td>44</td></tr></table>	Picture number	1	2	3	4	5	Number of matches	12	20	28	36	44	2 mrks: all correct OR 1 mrk: 3 correct	PFA	16.8, 16.14, 16.26, 16.32	K	(2)
Picture number	1	2	3	4	5													
Number of matches	12	20	28	36	44													
15.b.	84 matches <i>Possible thinking:</i> <ul style="list-style-type: none">• $44 + 8 \times 5 = 44 + 40 = 84$• $8 \times 10 + 4$	1 mrk: correct 1 mrk: valid thinking	PFA		A	(2)												

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
15.c	Picture 15 <i>Possible thinking:</i> <ul style="list-style-type: none"> Since Picture 10, used 84 matches; $84 + 8 \rightarrow 92 + 8 \rightarrow 100 + 8 \rightarrow 108 + 8 \rightarrow 116 + 8 \rightarrow 124$, i.e. another 5 pictures $124 - 4 \rightarrow 120 \div 8 \rightarrow 15$ 	1 mrk: correct 1 mrk: valid thinking	PFA		R	(2)
16.	36 dots <i>Possible thinking:</i> <ul style="list-style-type: none"> $10 + 5 \rightarrow 15 + 6 \rightarrow 21 + 7 \rightarrow 28 + 8 \rightarrow 36$ 	1 mrk: correct 1 mrk: valid thinking	PFA	16.3	A	(2)
17.a.	A and C only	1 mrk: BOTH correct and no extra	SS	13.40; 13.41; 15.40	A	(1)
17.b.	No lines of symmetry	1 mrk: correct	SS	13.42	K	(1)
17.c.		1 mrk: correct	SS	15.43; 14.45	K	(1)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
17.d.	The sum of the two shorter sides ($4\text{ cm} + 2\text{ cm} = 6\text{ cm}$) is shorter than the length of the longest side (7 cm) so the sides won't close.	1 mrk: evidence of sum of shorter sides 1 mrk: evidence that the 2 shorter sides are less than longest side <i>This may be illustrated as a sketch.</i>	SS	13.43	A	(2)
18.	B and F only	1 mrk: correct	SS	14.38; 14.41; 14.43	K	(1)
19.		2 mrks: all 4 correct options provided OR 1 mrk: 3 correct options and 1 incorrect option or 2 correct options and no other incorrect options (blank)	SS	14.44	R	(2)
20.a.	E9 marked on the plan	1 mrk: correct	SS	16.37, 16.38, 16.39	K	(1)
20.b.	4 rows	1 mrk: correct	SS		A	(1)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
21.	25 minutes to 7 pm; 6:35 pm and 18:35	2 mrks: all 3 correct and no extra 1 mrk: all 3 correct and at most 1 extra OR 2 correct and no extra	M	14.46; 14.47; 14.48; 14.49; 14.50	K	(2)
22.	120 g	1 mrk: correct	M	16.53, 16.56	K	(1)
23.a.	3 l	1 mrk: correct	M	16.48	K	(1)
23.b	400 ml	1 mrk: correct	M		A	(1)
24.	Abdul used larger bottle tops because he used fewer bottle tops to cover the same amount of space.	2 mrks: correct with valid explanation OR 1 mrk: valid explanation	M	16.44, 16.45	A	(2)
25.	14	1 mrk: correct	M		R	(1)
26.a.	18	1 mrk: correct	M	16.51, 16.52	K	(1)
26.b.	180	1 mrk: correct	M		A	(1)
27.	Δ <i>Possible thinking:</i> Δ is heavier than O which is heavier than \square . The \star is also lighter than the O.	1 mrk: correct 1 mrk: valid explanation	M	16.58	R	(2)

Ques	Correct solution(s)	Comment	Content area	Page ref.	Cognitive domain	Mark allocation
28.	<p>Vusi has labelled the number of children incorrectly.</p> <p>Possible correct graph:</p> 	<p>1 mrk: explanation that scale is inaccurate</p> <p>1 mrk: graph with accurate scale</p>	DH	13.56; 13.57; 13.63; 15.60	A	(2)
29.a.	Friday	1 mrk: correct	DH	16.59, 16.60, 16.61	K	(1)
29.b.	Sunday	1 mrk: correct	DH		A	(1)
29.c.	It is just as likely to rain on Tuesday as not to rain on Tuesday.	1 mrk: correct	DH	16.60	R	(1)