

UNIVERSITY EXAMINATIONS



Oct/Nov 2021

OPM1501

ORIENTATION TO PRIMARY MATHEMATICS

TOTAL MARKS: 100

3 hours 30 minutes

This paper consists of Thirteen (13) pages including the cover page.

INSTRUCTIONS:

- Non-programmable calculators may be used, unless otherwise specified.
- This is **NOT** an open-book examination and study material, or notes may **NOT** be consulted during the examination.
- Read the questions carefully.
- Use of a non-programmable pocket calculator is allowed.
- It is in your own interest to write legibly and to present your work neatly.

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OPM1501

Date: **09 September 2021**

Duration: **210 Minutes**

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3. NO emailed scripts will be accepted.
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Question 1

1.1. According to Kilpatrick, Swafford and Findel (2001), there are FIVE strands of mathematical proficiency that enable learners to view the world mathematically. Describe each strand of mathematical proficiency. (5)

1.2. What does it mean to mathematize? (2)

[7]

Question 2

Various options are provided as possible answers to the following questions. Write down the question number (2.1. – 2.11), choose the answer and write only the letter next to the question number.

2.1. **What does doing mathematics mean?**

- a) Explaining concepts and skills in such a manner that learners can do the exercises with ease.
- b) Generating strategies for solving problems, applying those strategies, seeing whether they lead to solutions and checking to see whether the answers make sense.
- c) Doing the operations(+, x, ÷, -) with whole numbers, fractions and decimal numbers correctly.
- d) Memorising procedures and concepts and apply this in different calculations and applications.

2.2. **What is linked to relational understanding?**

- a) Learning that occurs in a vacuum
- b) Producing correct answers rather than developing mathematical understanding
- c) Producing previously learnt facts
- d) Knowing what to do and why

2.3. **What can an integrated network of concepts also be called?**

- a) Thinking tools
- b) Social interaction
- c) Cognitive schemas
- d) New knowledge and skills

2.4. Which principle does not apply in terms of activities and content in a Vygotskian classroom?

- a) The ZPD serves as a guide for curricular and lesson planning.
- b) Learning occurs in a vacuum; the link to the real world is rarely made.
- c) Classroom activities should be reality based and applicable to the real world.
- d) Learning and development are social, collaborative activities.

2.5. What is considered as a strand of mathematical proficiency?

- a) Strategic competence
- b) Procedural fluency
- c) Rote learning
- d) Productive disposition

2.6. What does creating opportunities for reflective thought mean?

- a) Ideas that are not connected to each other.
- b) Not allowing students to construct deeper meaning for the mathematics they are learning.
- c) Providing feedback to learners
- d) Learners must find the relevant they possess and bring them to bear on the development of the new idea.

2.7. How can understanding be defined?

- a) Ideas and skills that are well known to us.
- b) A measure of the quality and quantity of connections that an idea has with existing ideas.
- c) The number of connections in our networks of ideas.
- d) Knowledge and skills that we can apply.

2.8. Which option relates to a low-level cognitive demand?

- a) Tasks are usually represented in multiple ways.
- b) It requires that students engage with the conceptual ideas that underlie procedures to successfully complete the task.
- c) There is no connection to related concepts.
- d) It requires considerable cognitive effort.

2.9. Good problems have multiple entries. What does this imply?

- a) Learners should not draw on their own network of mental tools, concepts and ideas.
- b) Teachers should dictate how learners must think about a problem to solve it.
- c) The diversity of learners in the classroom should not be accommodated to avoid problems.
- d) Learners should use different ideas of their own to solve a problem.

2.10. Which strategy may be used in the "before phase" of a lesson?

- a) The teacher summarizes the main ideas of the lesson.
- b) The teacher ensures that learners understand the problem before setting them to work.
- c) The teacher starts marking the classwork.
- d) The teacher explains the correct way to do homework.

2.11. Which action takes place in the "during phase" of a lesson?

- a) The teacher engages the class in discussions.
- b) The teacher lists the answers of all groups on the board without comment.
- c) The teacher allows learners to defend their answers.
- d) The teacher listens actively to find out what the learners know and how they think.

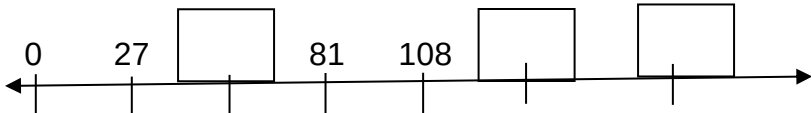
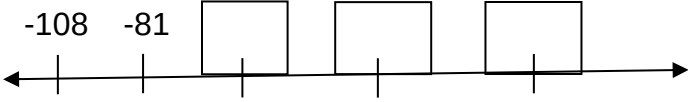
[11]

Question 3

3.1. Complete the following function machines so that the inputs gives the correct outputs.

- a) $8 \rightarrow \boxed{\times \dots} \rightarrow 56$ (2)
- b) $270 \rightarrow \boxed{- \dots} \rightarrow -240$ (2)
- c) $105 \rightarrow \boxed{\div \dots} \rightarrow 5$ (2)
- d) $170 \rightarrow \boxed{\dots} \rightarrow 90$ (3)
- (9)**

3.2. Complete these number lines by filling in the missing numbers.

- a) (3)
- 
- b) (3)
- 
- c) (3)
- 
- (9)**
- [18]**

Question 4

4.1. Mahlangu was in a long-jump competition. On his first jump he recorded a jump of 7m. On his second jump he jumped 7.15m. On his third jump he jumped 7.30kg. On his fourth jump, he jumped 7.45m.

- a) Explain the rule for this sequence? (2)
- b) If this pattern continues in the same way, what will Mahlangu jump on his tenth jump? (2)

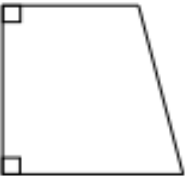
4.2. Lebo read a storybook to her 5-year-old child. On the first day she read up to page 7. On the second day she read up to page 12. On the third day she read up to page 17.

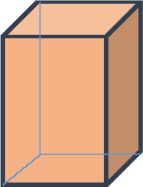
- a) Explain the rule for this sequence? (2)
- b) What page will she be up to on the fourth day? (2)
- c) How many pages will she have read up to on day 100? (3)

[11]

Question 5

5.1. Identify each of the following shapes:

- a)  (1)

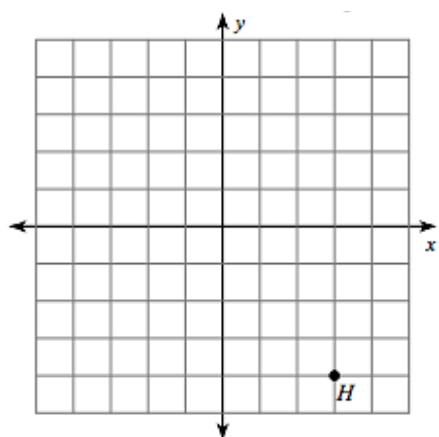
- b)  (1)

- c)  (1)

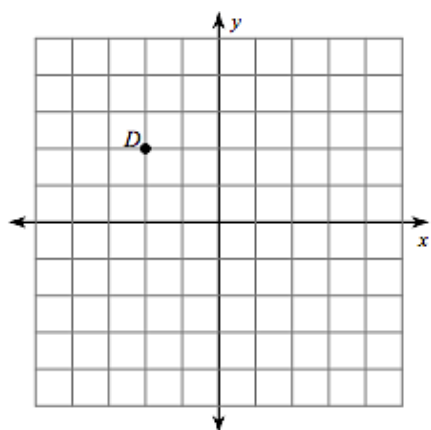
(3)

5.2. Determine the coordinates of the points after the given transformation has been performed

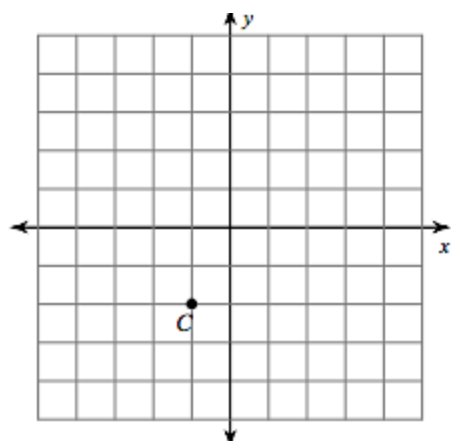
- a) rotation 180° clockwise about the origin (2)



- b) rotation 180° anti-clockwise about the origin (2)



- c) rotation 90° anti-clockwise about the origin (2)

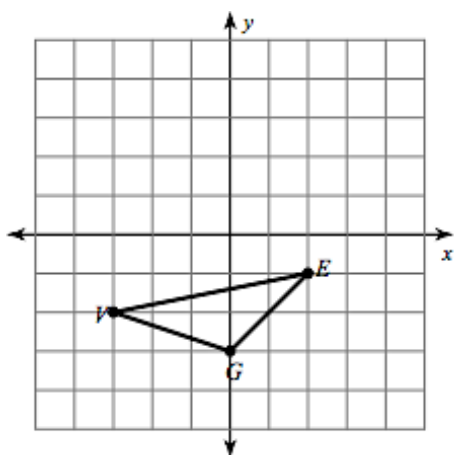


(6)

5.3. Determine the coordinates of the vertices of each figure after the given transformation has been performed

a) rotation 180° about the origin

(2)

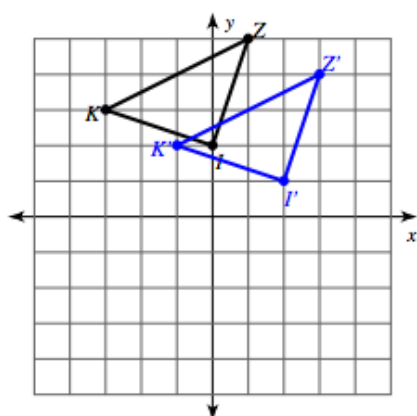


5.4. Write a rule to describe each of the following transformations.

(2)

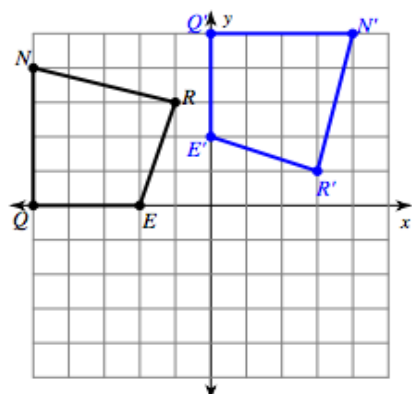
a) Triangle KIZ to K'I'Z'

(2)



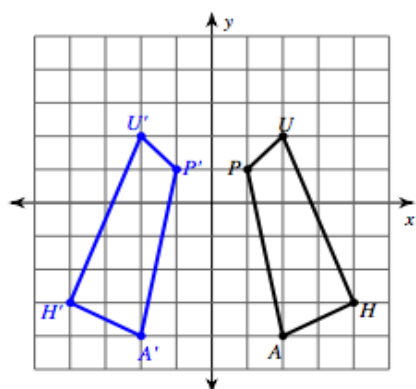
(2)

b) Quadrilateral NQER to N'Q'E'R'



(2)

c) Quadrilateral UPAH to U'P'A'H'



(2)

(6)

[17]

Question 6

6.1. The marks of 20 Grade 6 mathematics learners in a class are recorded as follows:

Learner	Mark
Mbali	34
Jason	58
Lebo	73
Donald	87
Donovan	58
Mulo	75
Nonthethelelo	37
Luyanda	61
Sifiso	62
Tlangi	61
Jacob	91
Ntombi	58
Mokgadi	37
Sannah	92
Mahlatse	27
Xikombiso	37
Thabisile	47
Lindi	88
Simon	55
Lereko	37

6.1.1. Use the data above to determine the following:

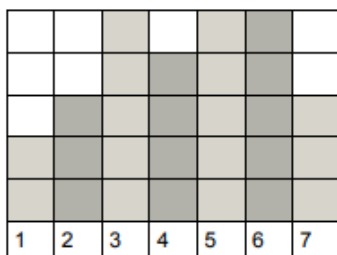
- Median (2)
- Mean (4)
- Who got the highest mark? (1)
- Mode (2)
- Range (2)

[11]

Question 7

- 7.1. Tumi created a chart to depict how many mm her indoor plant grew each week for 7 weeks. Each block equals 5 mm of growth. How tall is the plant in centimetres?

(3)



- 7.2. Mulo begins a new walking program with 600m on the first day. Each day, he will increase his walk by 200m. How many kilometres will he walk on day 18 of his program?
- 7.3. Nombuso Kunene, the jewellery designer, ordered 500 grams of silver, 800 grams of brass, and 700 grams of copper. How many kilograms of metal did she order excluding copper?
- 7.4. Sandra purchased the following groceries at Shoprite: 8kg of sugar, 10kg of flour, 500g of cocoa, 225g of pecans, and 275g of coconut. How much do all her groceries weigh in kilograms?

(3)

(3)

(3)

[12]

Question 8

- 8.1. Test the following numbers for divisibility by 3, 5, 10. (Do not divide or factorise.)

a) 2 248 740 (2)

b) 21 589 250 (2)

- 8.2. Use the vertical and horizontal algorithms to find the sum or difference of the following. (Explain the "borrow and carry" concepts.)

a) 587 + 620 (1)

b) 749 – 568 (1)

- 8.3. Compare the fractions $\frac{3}{5}$ and $\frac{3}{8}$ by using a number line. (You should arrange the fractions from small to big). Make sure that you choose the whole correctly and make accurate drawings. (4)

8.4. The exercise below is based on your understanding of the fraction concept.

8.4.1. If the rectangle is one whole, show the following:



Redraw the same
rectangle to illustrate
your answer.

- | | |
|-------------------|-------------|
| a) One fifth | (1) |
| b) Three quarters | (1) |
| c) Three sixth | (1) |
| | [13] |

[TOTAL: 100]

1st Examiner: Mr HW Mbhiza

2nd Examiner: Ms C Machaba

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I have not copied work of others and handed it in as my own. I have also not made my work available to any fellow students to submit as their own.

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