

# **Tutorial Letter 101/3/2020**

## **Spatial Development, Geometry and Trigonometry in Intermediate and Senior Phase Mathematics**

**MAE102K**

**Semesters 1 and 2**

**Department of Mathematics Education**

This tutorial letter contains important information  
about your module.

BARCODE

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Dear Student

As part of this tutorial letter, we wish to inform you that Unisa has implemented a transformation charter based on five pillars and eight dimensions. In response to this charter, we have also placed curriculum transformation high on the agenda. For your information, curriculum transformation includes the following pillars: student-centred scholarship, the pedagogical renewal of teaching and assessment practices, the scholarship of teaching and learning, and the infusion of African epistemologies and philosophies. These pillars and their principles will be integrated at both the programme and module levels, as a phased-in approach. You will notice the implementation thereof in your modules, and we encourage you to fully embrace these changes during your studies at Unisa.

## 1 INTRODUCTION TO THE MODULE

Dear Student

Welcome to this module. I hope that you will find it both interesting and rewarding. The lecturer will do her best to make your study of this module successful. You will be well on your way to success if you start studying early in the semester and decide to do assignment(s) properly. You will receive a number of tutorial letters during the semester. A tutorial letter is a way of communicating with you about teaching, learning and assessment involving this module. This tutorial letter contains important information about scheme of work, resources and assignments for this module. I urge you to read it carefully and to keep it at hand when working through the study material, preparing the assignment(s), preparing for the examination and addressing questions to your lecturer.

In this tutorial letter (101), you will find the assignments and assessment criteria as well as instructions on the preparation and submission of the assignments. It also provides all the information you need about the prescribed study material and other resources and how to obtain them. Please study this information carefully and make sure that you obtain the prescribed material as soon as possible. We have also included certain general and administrative information about this module. Please study this section of the tutorial letter carefully. Right from the start, I would like point out that **you must read all the tutorial letters** you receive during the semester **immediately and carefully**, as they always contain important and, sometimes, urgent information.

I hope that you will enjoy this module and wish you all the best!

## **2 PURPOSE AND OUTCOMES**

### **2.1 Purpose**

The purpose of this module is to develop your spatial sense and expand your teaching practice by suggesting a few fresh and exciting principles for enhancing your learners' spatial sense and experience.

### **2.2 Outcomes**

Upon completion of this module you should:

- Be able to name and describe each of the five Van Hiele levels of geometric development;
- Be able to name and explain the different isometric transformations, reflections, translations, rotations and glide reflections;
- Be familiar with the different geometric shapes and their properties; and,
- Be able to define and apply trigonometry in right-angled triangles.

## **3 LECTURER(S) AND CONTACT DETAILS**

### **3.1 Lecturer(s)**

#### **Lecturer(s)**

|                             |                                             |
|-----------------------------|---------------------------------------------|
| Lecturer's name:            | Ms Puleng Motseki                           |
| Building and office number: | AJH Building; Office 7-42(Floor 7, Room 42) |
| E-mail address:             | motsepd@unisa.ac.za                         |
| Telephone number:           | 012 429 4177                                |

### **3.2 Department**

All academic queries that are not of a purely administrative nature but are related to the content of this module should be directed to the lecturer (Ms Puleng Motseki). Please have your student number with you when you contact the lecturer. E-mail and telephone numbers are included in Section 3.1 but you might also want to write to the lecturer. Letters should be sent to:

Ms Puleng Motseki  
 Department of Mathematics Education  
 PO Box 392  
 UNISA  
 0003

### 3.3 University

If you need to contact the University about matters that are not related to the content of this module, please consult the booklet *Study @ Unisa* that you received with your study material. This booklet contains information on how to contact the University (e.g. to whom you can write for different queries, important telephone and fax numbers, addresses and details of the times certain facilities are open). Always have your student number at hand when you contact the University. Please note that all administrative enquiries should be directed to Unisa. Enquiries will then be channelled to the correct department. The details are as follows:

- Fax number (RSA) 012 429 4150
- Fax number (International) 012 429 4150
- E-mail [study-info@unisa.ac.za](mailto:study-info@unisa.ac.za)

## 4 RESOURCES

### 4.1 Prescribed book(s)

Van de Walle, J.A., Karp, K.S., & Bay-Williams, J.M. (2016). *Elementary and middle school mathematics – Teaching developmentally*. 9<sup>th</sup> Edition (Global Edition). New Jersey: Pearson Education.

### 4.2 Recommended book(s)

There are no recommended books for this module. However, the lecturer does recommend that you read widely in order to keep abreast with contemporary mathematics education literature and reforms.

### 4.3 Electronic reserves (e-reserves)

Check the myUnisa site for this module and look under “Resources”. If you have access to a computer that is linked to the internet you can quickly access resources and information at the University. The myUnisa learning management system is Unisa’s online campus that will help you to communicate with your lecturer, other students and administrative departments at Unisa- all through the computer and the internet. To go to myUnisa website start at the main Unisa

website, <http://www.unisa.ac.za>, and then click on the “Login to myUnisa” link on the right-hand side of the screen . This should take you to the myUnisa website. You can also go there directly by typing <http://my.unisa.ac.za>. Please consult the booklet on the links in Section 4.4. *et Study @ Unisa*, which you received with your study material for more information.

E-reserves can be downloaded from the library catalogue. More information is available at:

<http://libguides.unisa.ac.za/request/request>

#### 4.4 Library services and resources information

The Unisa Library offers a range of information services and resources:

- for brief information go to: <https://www.unisa.ac.za/library/libatglance>
- for more detailed Library information, go to <http://www.unisa.ac.za/sites/corporate/default/Library>
- for research support and services (e.g. Personal Librarians and literature search services), go to <http://www.unisa.ac.za/sites/corporate/default/Library/Library-services/Research-support>

The Library has created numerous Library guides: <http://libguides.unisa.ac.za>

Recommended guides:

- request and find library material/download recommended material: <http://libguides.unisa.ac.za/request/request>
- postgraduate information services: <http://libguides.unisa.ac.za/request/postgrad>
- [finding and using library resources and tools:](http://libguides.unisa.ac.za/Research_skills) [http://libguides.unisa.ac.za/Research\\_skills](http://libguides.unisa.ac.za/Research_skills)
- Frequently asked questions about the Library: <http://libguides.unisa.ac.za/ask>
- Services to students living with disabilities: <http://libguides.unisa.ac.za/disability>

[Important contact information:](#)

- <https://libguides.unisa.ac.za/ask> - Ask a Librarian
- [Lib-help@unisa.ac.za](mailto:Lib-help@unisa.ac.za) - technical problems accessing library online services
- [Library-enquiries@unisa.ac.za](mailto:Library-enquiries@unisa.ac.za) - general library related queries
- [Library-fines@unisa.ac.za](mailto:Library-fines@unisa.ac.za) - for queries related to library fines and payments

## 5 STUDENT SUPPORT SERVICES

The *Study@Unisa* brochure is available on myUnisa: [www.unisa.ac.za/brochures/studies](http://www.unisa.ac.za/brochures/studies)

This brochure has all the tips and information you need to succeed at distance learning and, specifically, at Unisa.

## 6 STUDY PLAN

Refer to the booklet *Study @ Unisa* brochure for help with general time management and planning skills.

## 7 PRACTICAL WORK

This module does not have the practical work and work-related components. However, this module will address pertinent issues in school geometry to assist you in the planning of your relevant teaching practice lessons on mathematics in the intermediate and senior phases.

## 8 ASSESSMENT

### 8.1 Assessment criteria

The marking of the assignments is based on your understanding of the concepts that are covered in each assignment. The assessment criterion, which provides information on how a task/assignment is assessed, is usually written at the end of the assessment

### 8.2 Assessment plan

This is a semester module. Assignments are seen as part of the learning material for this module. As you do the assignments study the reading texts, consult other resources, discuss the work with fellow students or tutors or do research, and be actively engaged in your learning. The assessment criteria for each assignment will help you to understand more clearly what is required of you. There are **two** assignments per semester for this module. Assignment 1 contributes 20% and assignment 2 contributes 80% to the semester (year mark) (See, Table below)

| Assignment/ exam | Type            | % contribution to semester mark | Collective contribution to final mark |
|------------------|-----------------|---------------------------------|---------------------------------------|
| 01               | Multiple choice | 20%                             | 20%                                   |
| 02               | Written         | 80%                             |                                       |
| Examination      | Written         | N/A                             | 80%                                   |

## 8.3 Assignment numbers

### 8.3.1 General assignment numbers

Each semester will consist of 2 assignments for this module. Assignments are numbered consecutively per module, starting from 01 (See the table in Section 8.3.2)

### 8.3.2 Unique assignment numbers

The sequencing of assignments for each semester and their respective unique numbers will be as follows:

#### First semester:

| Assignment | Due date   | Unique number | Type            | Contribution to semester mark | Contribution to final mark |
|------------|------------|---------------|-----------------|-------------------------------|----------------------------|
| 01         | 2020/02/20 | 667338        | Multiple choice | 20%                           | 20%                        |
| 02         | 2020/03/18 | 712516        | Written         | 80%                           |                            |
| Exam       |            |               |                 |                               | 80%                        |

#### Second semester

| Assignment | Due date   | Unique number | Type            | Contribution to semester mark | Contribution to final mark |
|------------|------------|---------------|-----------------|-------------------------------|----------------------------|
| 01         | 2020/08/05 | 617346        | Multiple choice | 20%                           | 20%                        |
| 02         | 2020/09/10 | 882245        | Written         | 80%                           |                            |
| Exam       |            |               |                 |                               | 80%                        |

## 8.4 Assignment due dates

See the tables in Section 8.3.2 for the due dates of each assignment in this module in each semester.

## 8.5 Submission of assignments

You may submit written assignments and assignments done on mark-reading sheets either by post or electronically via *MyUnisa*. **Online submissions should be made through PDF formats (assignments to be submitted in PDF formats for online marking).** Assignments may **not** be submitted by fax or e-mail. For detailed information and requirements as far as assignments are concerned, see the booklet *Study @ Unisa*, which you received with your study material. To submit an assignment via **myUnisa**:

- Go to my myUnisa.
- Log in with your student number and password.
- Select the module.

- Click on assignments in the assignment you want to submit.

Follow the instructions on the screen

## 8.6 The assignments

Please note that although students may work together when preparing assignments, each student must write and submit his or her own individual assignment. In other words you must submit your own ideas in your words, sometimes interspersing relevant short quotations that are properly referenced. It is unacceptable for students to submit identical assignments on the basis that they work together. This is regarded as copying (a form of plagiarism) and **none of the seemingly identical assignments will be marked**. Furthermore, you may be penalised or subjected to disciplinary proceedings by the University for copying the work of another student.

Sampling of assignment questions for marking purposes

The MAE 102K is a semester module and time should be used sparingly and wisely to cover all mathematical concepts and pedagogical issues covered in the module. The first assignment is a multiple choice type and should be submitted online as it is marked through an institutional computer. **All questions of assignment 1 should be done and all of them will be marked to form part of the year mark.** (See Table in 8.3.2). The assignment 2 given for this module in each semester is rather too long with a purpose to allow students to interact widely and deeply with issues covered in the module. However, **when marking assignment 2 of this module the lecturer will sample a few questions, usually amounting to 100 marks, to facilitate quick and effective assessment procedures.** The sampling, which is at the discretion of the lecturer, will be facilitated in a manner that is almost representative of all questions asked in assignment 2. Given this arrangement students are advised to do all questions asked in assignment 2 thoroughly as they would not be in a position to determine in advance the questions that the lecturer will eventually sample for marking purposes. Therefore all questions in the assignment 2 of this module are equally important and quality time should be spent in doing them. Normally students will be supplied with tutorial letter 201 (memorandum) to view solutions to the entire questions of assignment 2 of this module.

## 8.7 Other assessment methods

None

## 8.8 The examination

For general information and requirements as far as assignments are concerned, refer to the booklet *Study @ Unisa*, which you received with your study material.

To gain entrance to the examination **you will need to submit the multiple-choice assignment (assignment 1) pertaining to the semester in which you take this module.** You will not be allowed to write the examination if you have not submitted assignment 1 of this module.

**Assignment 1** contributes 20% towards the **semester mark** and **assignment 2** contributes 80% towards the **semester mark** (please refer to the Tables in Sections 8.2 & 8.3.1).

## **9 FREQUENTLY ASKED QUESTIONS**

The booklet, *Study @ Unisa*, contains an A to Z guide to the questions most asked by students. Please refer to this brochure for frequently asked questions.

## **10 SOURCES CONSULTED**

UNISA ODL Policy (2008) & UNISA Language Policy (2016)

## **11 IN CLOSING**

I wish you a good and fulfilling academic year when studying this module in 2020.

## **12 ADDENDUM**

The criteria and guidelines for doing assignment 2 of semester 1 and semester 2 are provided at the beginning of these assignments.

**ASSIGNMENTS FOR FIRST SEMESTER OF MAE102K 2020****Assignment 01**

Assignment 1 is compulsory for examination admission.

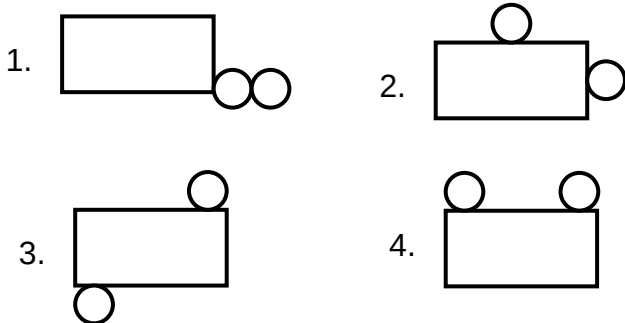
Due date: 2020/02/20

Remember

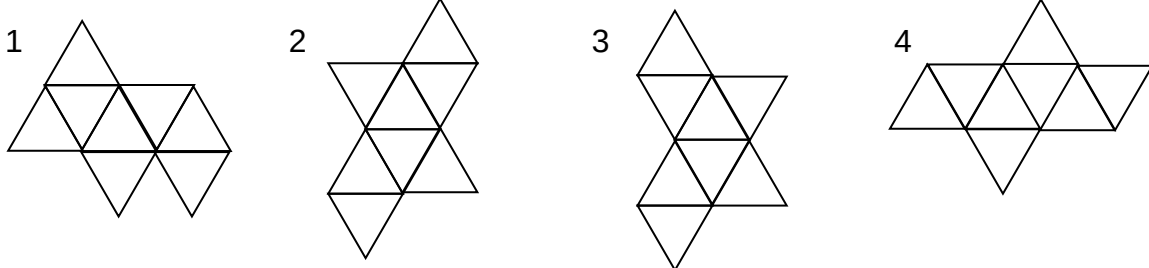
Make sure you fill in the following information in the space provided on the mark-reading sheet.

- student number:
- module code: MAE102K
- unique number: 667338
- assignment number: 01

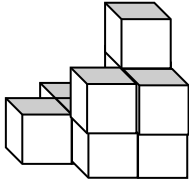
1. Which diagram(s) do not represent the net of a cylinder?



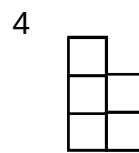
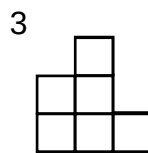
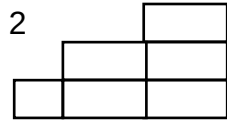
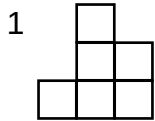
2. Which of the following is a net of an octahedron?



3. Phello used cubes to construct the following diagram.



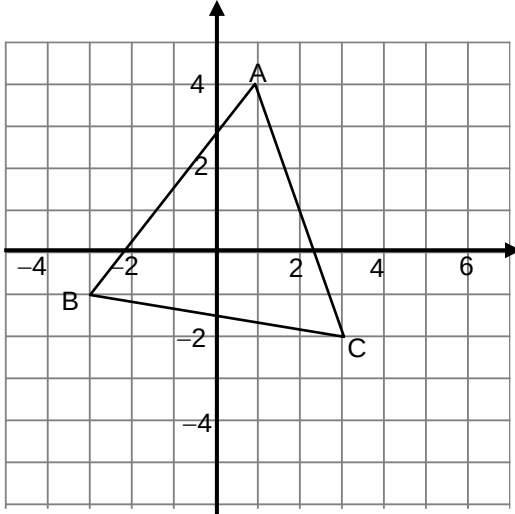
Which illustration represents the view of the figure from the front?



4. What is an obtuse angled triangle?

- 1 Has three different angles and none of its sides are equal in length
- 2 Has three equal sides and angles
- 3 Has an angle greater than  $90^\circ$  and two acute angles
- 4 can be drawn in many different ways

5.  $\triangle ABC$  is translated 4 units down and 2 units left. The new coordinates of A are



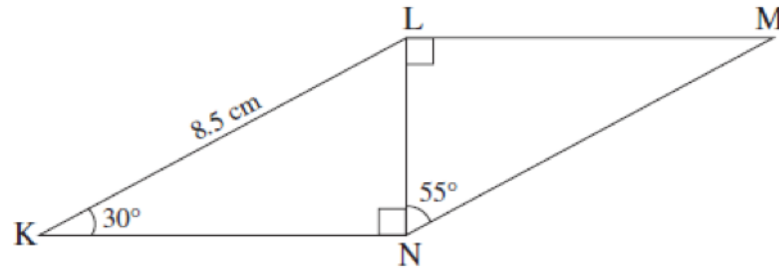
- 1  $(0; -2)$
- 2  $(-3; 2)$
- 3  $(0; 2)$
- 4  $(-1; 0)$

6. Which of the polygons can be used to create a pure tessellation?

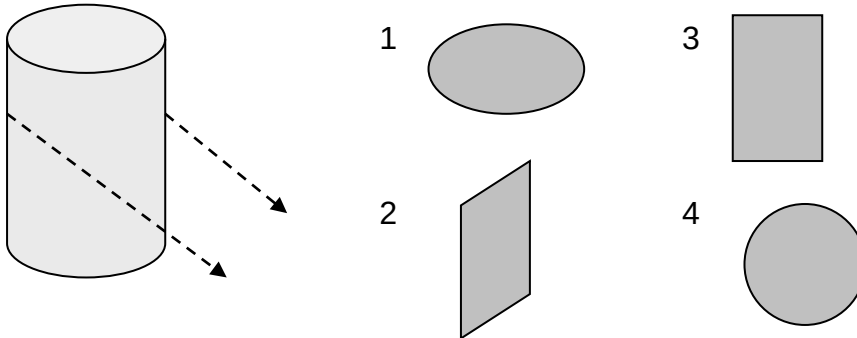
- 1 a square
- 2 a kite
- 3 a regular pentagon
- 4 a regular hexagon

7. What is the length of side MN? (Rounded to one decimal place)

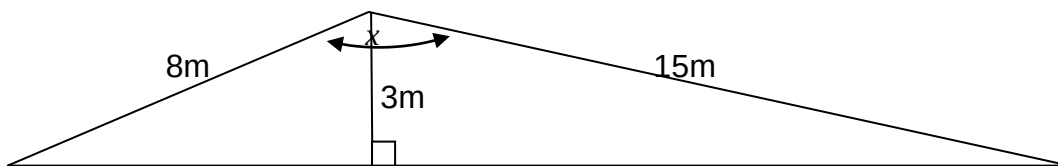
- 1 7, 0 cm
- 2 7, 4 cm
- 3 8, 6 cm
- 4 12, 8 cm



8. A cylinder is sliced through as indicated by the dotted line. Which of the following represents the two dimensional face of the slice?



9. The diagram below shows the structure of a roof. What is the size of the angle,  $x$ , at the peak of the roof? (Correct to the nearest degree)



- |   |      |   |      |
|---|------|---|------|
| 1 | 157° | 2 | 148° |
| 3 | 146° | 4 | 136° |

10. "Two lines in a plane always intersect at exactly one point."

Which of the following is synonymous with the statement above?

- 1 coplanar lines
- 2 parallel lines
- 3 perpendicular lines
- 4 intersecting lines

TOTAL: 10

## Assignment 02

Unique number: 712516

Due date:2020/03/18

This assignment is based on Tutorial Letter 501 and chapter 20 in the prescribed book.

### Question 1

- 1.1 Define Van Hiele's geometrical thought.
- 1.2 Describe the last two levels of Van Hiele's geometric thought. (9)
- 1.3 If you use the word "parallelogram" in a class what would a learner on each of the following Van Hiele levels think of?
- 1.3.1 a learner on level 0
- 1.3.2 a learner on level 1
- 1.3.3 a learner on level 2 (6)
- [15]

### Question 2

Copy this table in your script. For each statement, say whether it is true or false.

|    | STATEMENT                                                     | TRUE/FALSE |
|----|---------------------------------------------------------------|------------|
| 1  | A kite has all opposite angles equal                          |            |
| 2  | Parallel lines can intersect at right angles                  |            |
| 3  | A hexagonal prism is a nonagon                                |            |
| 4  | All prisms have triangular faces                              |            |
| 5  | A cuboid is a regular hexahedron                              |            |
| 6  | Regular pentagons tessellate                                  |            |
| 7  | An isosceles trapezium has two pairs of equal angles          |            |
| 8  | The sum of the interior angles of a dodecagon is $1550^\circ$ |            |
| 9  | A triangle is a polygon                                       |            |
| 10 | A rhombus is a square                                         |            |

[10]

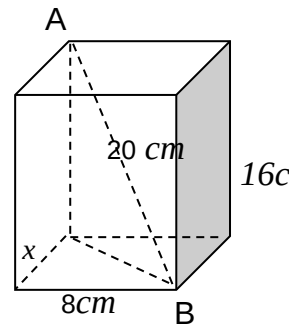
### Question 3

Fill in the missing words to make the statements true:

- 3.1 The geometry tool used to measure the size of an angle in degrees is called a(n) \_\_\_\_
- 3.2 A(n) \_\_\_\_ of a circle connects its centre to a point on the circle.
- 3.3 A segment connecting any two non-adjacent vertices in a polygon is called a(n) \_\_\_\_
- 3.4 A polygon with 8 sides is called a(n) \_\_\_\_
- 3.5 A(n) \_\_\_\_ polygon is both equiangular and equilateral. (5)

### Question 4

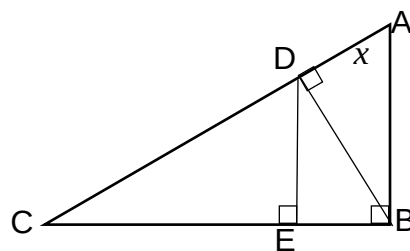
- 4.1 The dimensions of the rectangular prism are given in the diagram.  $AB = 10\text{cm}$  is the line segment joining the two opposite vertices. Calculate the value of  $x$ , the width of the base.



[5]

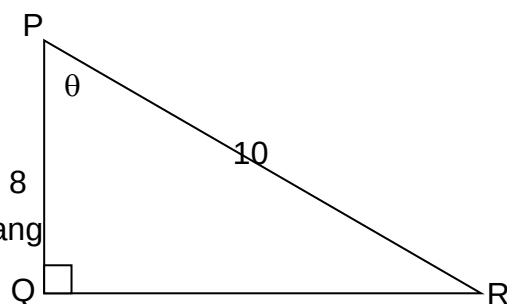
### Question 5

- 5.2 Write down THREE expressions for  $\sin x$



(6)

- 5.3 Triangle PQR is given alongside.



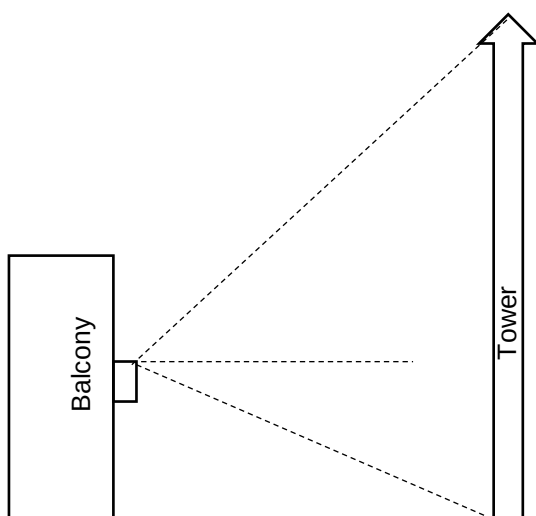
- 5.3.1 Calculate the length of QR in the triangle. (3)

- 5.3.2 Find the size of angle P. (3)

- 5.4 Refer to the diagram below. From a balcony on the third floor of a building, Joanie looked up to a church tower on the other side of the street. She measures the angle of elevation to the top of the tower to be  $62^\circ$ , and the angle of depression to the foot of the tower, to be  $34^\circ$ . The two buildings are  $534m$  apart.

5.4.1 Redraw the diagram in your script and indicate the information provided. (2)

5.4.2 Calculate the height of the tower. (4)



[18]

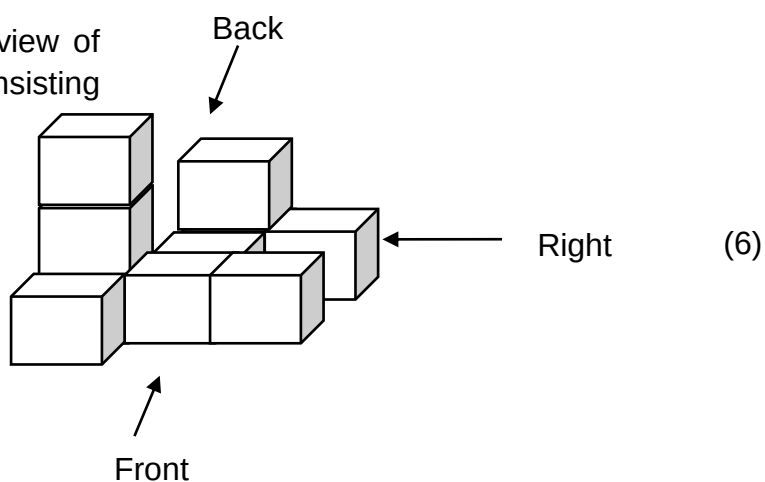
### Question 6

6.1 Draw the following objects on isometric dot paper (see Appendix B on page 35 of this tutorial letter):

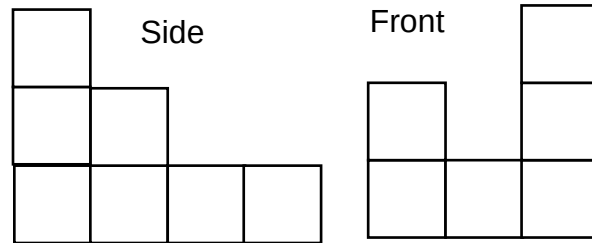
6.1.1 A hexagonal pyramid (3)

6.1.2 A triangular prism (3)

6.2 Draw the front, right and back view of the three dimensional object, consisting of cubes.



- 6.3 The side and front view of a three dimensional structure is given. Draw the possible structure



(2)

[14]

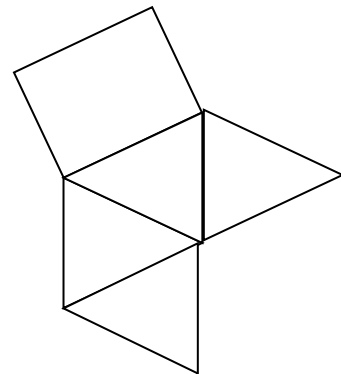
### Question 7

- 7.1 Draw the following objects on isometric dot paper (see page 35 of this tutorial letter)

7.1.1 a hexagonal pyramid (2)

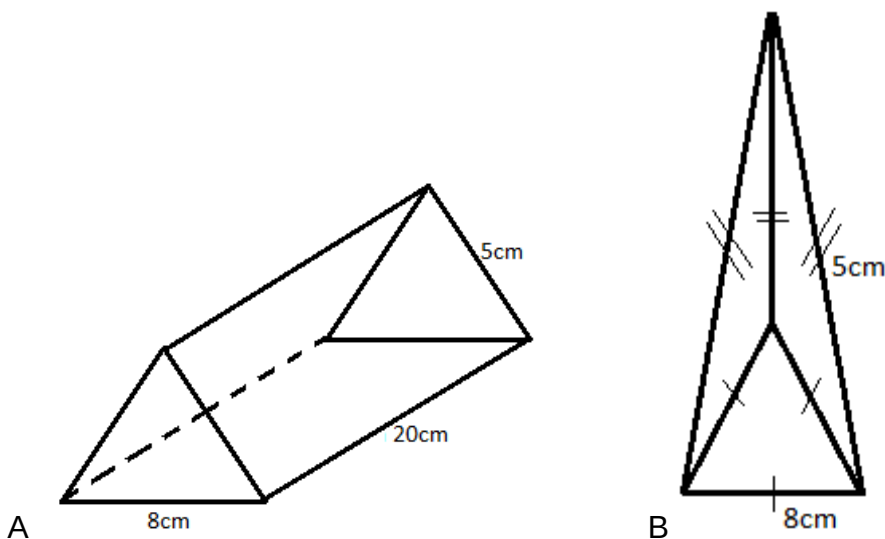
7.1.2 a triangular prism (2)

- 7.2 Sketch the three-dimensional figure formed by folding the net into a solid. Name the solid.



(3)

- 7.3 You are given diagrams A and B representing two 3D objects. Study the diagrams and answer the questions that follow:



- 7.3.1 Give names for the 3D objects represented in diagrams A and B.

(2)

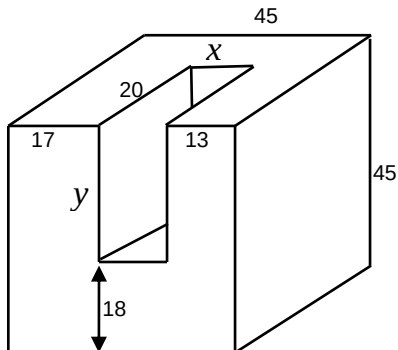
7.3.2 Does diagram A have rotational symmetry? Explain your answer. (3)

7.3.3 Name three properties of A (3)

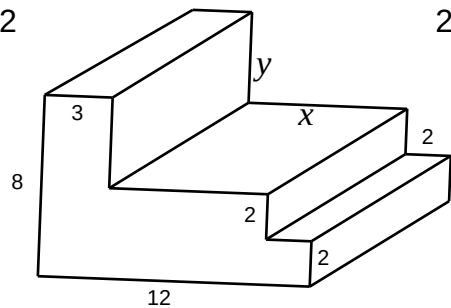
7.3.4 Draw the net of B. (2)

7.4 Find the lengths of  $x$  and  $y$ .

7.4.1



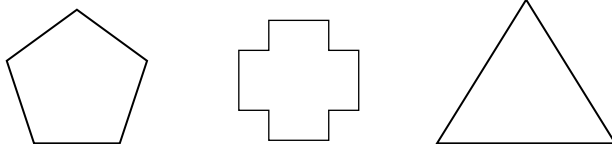
7.4.2



(4)

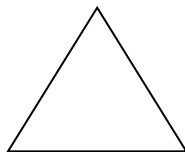
### Question 8

8.1 What is the order of rotational symmetry of each of the following figures? (3)

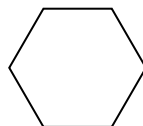


8.2 Draw a tessellation pattern using each of the following shapes. You must have at least three rows for each pattern. (6)

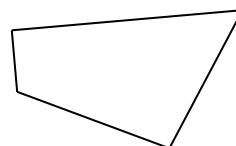
8.2.1



8.2.2

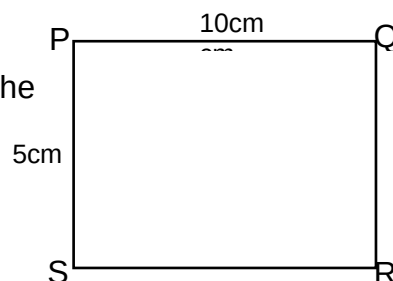


8.2.3



8.3 Rectangle PQRS is given:

If you were to enlarge rectangle PQRS so that the side PS is 10 cm, how long would side PQ be in enlargement?

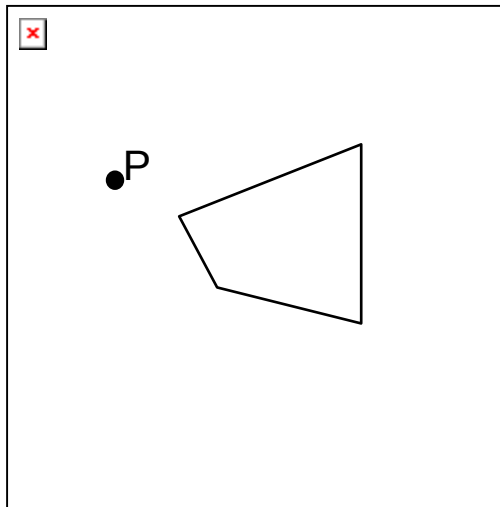


(3)

[12]

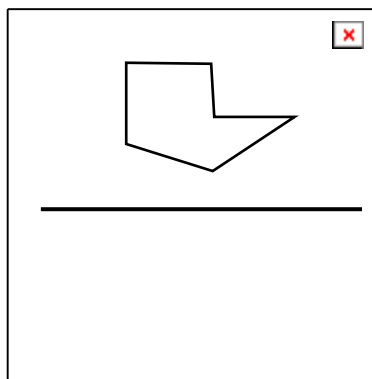
### Question 9

9.1 Rotate the figure 90° clockwise around the point P.



(3)

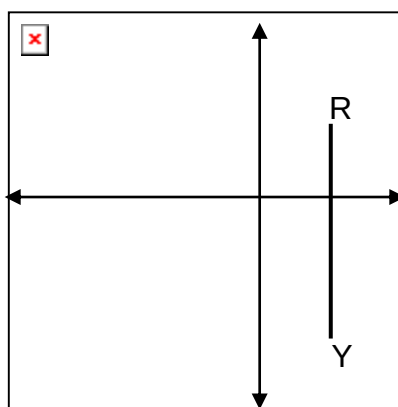
9.2 Reflect the figure in the horizontal line.



(3)

9.3 Accurately redraw the following drawings in your answer book.

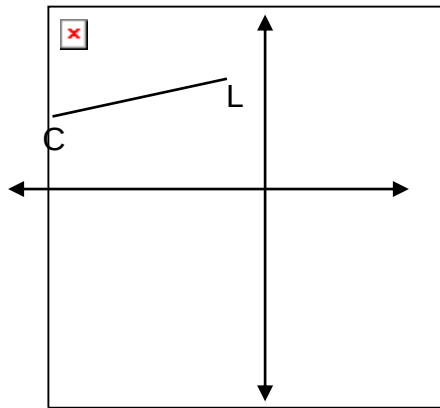
Locate point L so that  $\triangle LRY$  is an isosceles triangle, Can you find more than one answer? Illustrate your answer(s).



(3)

9.4

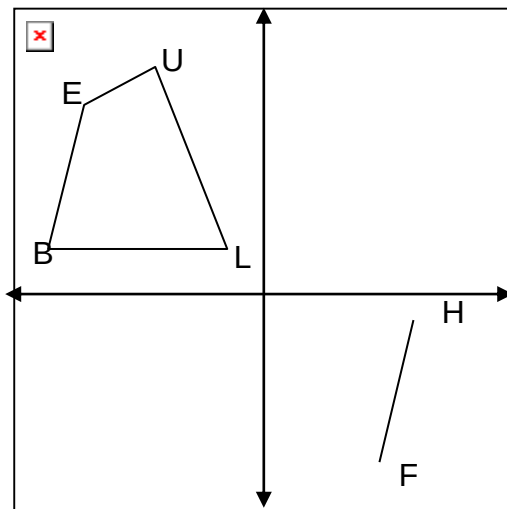
Locate point R so that  $\triangle CRL$  is an isosceles right triangle. Can you find more than one answer?



(3)

9.5

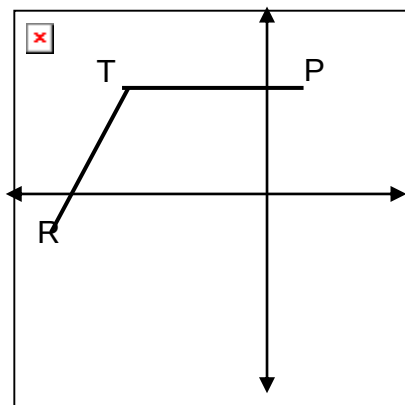
Draw quadrilateral FISH so that it is congruent to quadrilateral BLUE. Line segment FH is given on the grid.



(3)

9.6

TRAP is parallelogram. Complete the drawing



(3)

[18]

Question 10

Read the chapter "Planning in the problem based classroom" to understand what is expected of the teacher in the "before", "during" and "after" stages of a problem based lesson.

Draw up a lesson plan on the topic of "Enlargement and reduction of a rectangle" for grade 6 learners.

- |      |                                                                                                   |     |
|------|---------------------------------------------------------------------------------------------------|-----|
| 10.1 | Describe what you will do in each of the three stages.                                            | (9) |
| 10.2 | List at least five questions that you will pose to learners to provoke a constructive discussion. | (5) |
| 10.3 | Clearly describe what manipulatives you will use in the lesson                                    | (2) |
| 10.4 | Design a worksheet and supply a memorandum                                                        | (6) |

**[22]**

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**TOTAL: 150**

## ASSIGNMENTS FOR THE SECOND SEMESTER OF MAE102K

### Assignment 01

Assignment 1 is compulsory for examination admission

Due date: 2020/08/05

#### Remember

Make sure you fill in the following information in the space provided on the mark-reading sheet.

- student number:
- module code:
- unique number: 617346
- assignment number: 01

1. If the scale on a map indicates that 5 cm = 2 km, what would be the actual length of a line segment shown on a map as 24 cm?

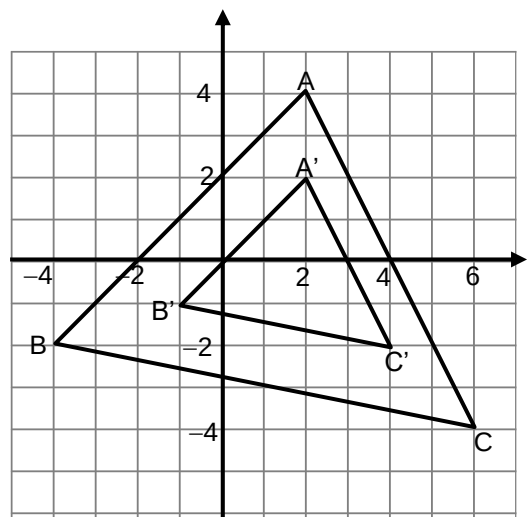
- 1 9,6 km
- 2 0,42 km
- 3 8 km
- 4 60 km

2. Which statement is false?

- 1 All rectangles are parallelograms
- 2 Some rhombuses are rectangles.
- 3 Every square is a parallelogram
- 4 Every parallelogram is a rhombus

3. What is the scale factor of the dilation on triangle ABC onto  $\triangle A'B'C'$  shown at the left?

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



4. Which of the following statements is false?

- 1 Some squares are rhombuses
- 2 No rhombuses are kites
- 3 If a quadrilateral is a square, then it is a kite
- 4 If a quadrilateral is a rhombus, then it is a square

5. Which description does not guarantee that a quadrilateral is a square?

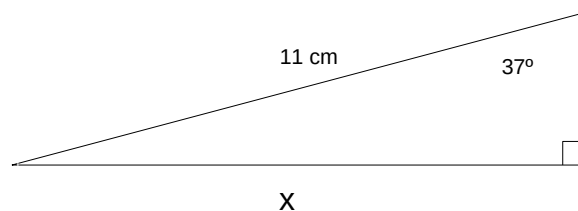
- 1 Has sides congruent and all angles congruent
- 2 is both a rectangle and a rhombus
- 3 Has all right angles and has all sides congruent
- 4 is a parallelogram with perpendicular diagonals

6. Which of the following best describes inductive reasoning?

- 1 using logic to draw conclusions based on accepted statements
- 2 accepting the meaning of a term without a definition
- 3 defining mathematical terms to correspond with physical objects
- 4 inferring a general truth by examining a number of specific examples

7. Which of the following expressions represents the length of  $x$  ?

- 1 6.4
- 2 6.8
- 3 6.67
- 4 6.55



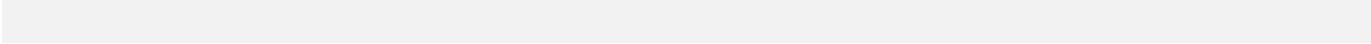
8. Which of the polygons cannot be used to create a pure tessellation?

- 1 a quadrilateral
- 2 a kite
- 3 a regular octagon
- 4 a regular hexagon

9. Which triangles would be similar?
- 1 two isosceles triangles with a congruent base
  - 2 two scalene triangles with congruent bases
  - 3 two right-angled triangles
  - 4 two equilateral triangles
10. A statement that is assumed to be true without proof is called a \_\_\_\_\_
- 1 converse
  - 2 conjecture
  - 3 corollary
  - 4 postulate

---

TOTAL: 10



## 2 Assignment 02

Unique number: 882245

Due date: 2020/09/10

This assignment deals with Tutorial Letter 501 and chapter 20 in the prescribed book.

### Question 1

- 1.1 Explain the first three levels of Van Hiele's geometric thought. (9)
- 1.3 If you use the word "triangle" in a class what would a learner on each of the following Van Hiele levels think of?
- 1.3.1 a learner on level 0
- 1.3.2 a learner on level 1
- 1.3.3 a learner on level 2 (6)

**[15]**

### Question 2

Copy this table in your script.

For each statement, say whether it is true or false.

|   | STATEMENT                                           | TRUE/FALSE |
|---|-----------------------------------------------------|------------|
| 1 | A kite has a pair of equal adjacent sides           |            |
| 2 | A parallelogram with equal diagonals is a rectangle |            |
| 3 | A rhombus with equal diagonals is a square          |            |
| 4 | A triangle can have more than one right angle       |            |
| 5 | An equilateral hexagon is equiangular               |            |
| 6 | Parallel lines can lie in two different planes      |            |
| 7 | An equiangular triangle is equilateral              |            |

|    |                                            |  |
|----|--------------------------------------------|--|
| 8  | A regular pentagon has 5 lines of symmetry |  |
| 9  | A tetrahedron has four edges               |  |
| 10 | All congruent quadrilaterals tessellate    |  |

[10]

### Question 3

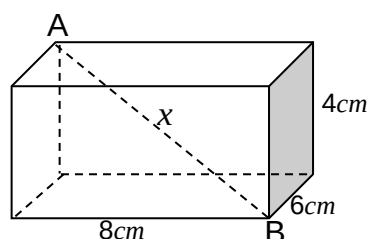
Fill in the missing words to make the statements true:

- 3.1 Lines are \_\_\_\_\_ if they lie in the same plane
- 3.2 Two or more circles with the same centre are called \_\_\_\_\_
- 3.3 A(n) \_\_\_\_\_ of a circle connects two points on the circle.
- 3.4 A segment connecting any two non-adjacent vertices in a polygon is called a(n) \_\_\_\_\_
- 3.5 A(n) \_\_\_\_\_ polygon is both equiangular and equilateral.

[5]

### Question 4

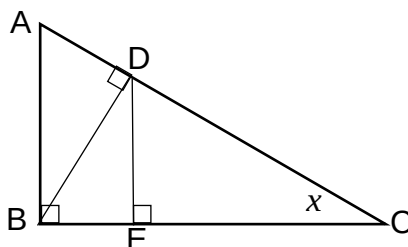
- 4.1 The dimensions of the rectangular prism are given in the diagram. AB is the line segment joining the two opposite vertices. Calculate the value of  $x$ .



[5]

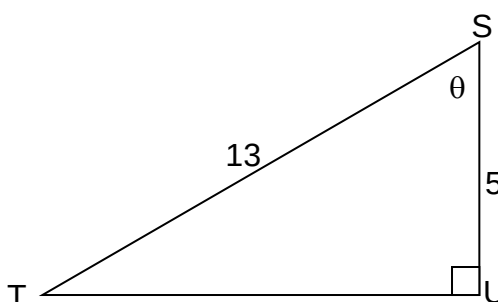
### Question 5

- 5.1 Write down THREE expressions for  $\cos x$



(6)

- 5.2 Triangle STU is given alongside.



5.2.1 Calculate the length of TU in the triangle above. (3)

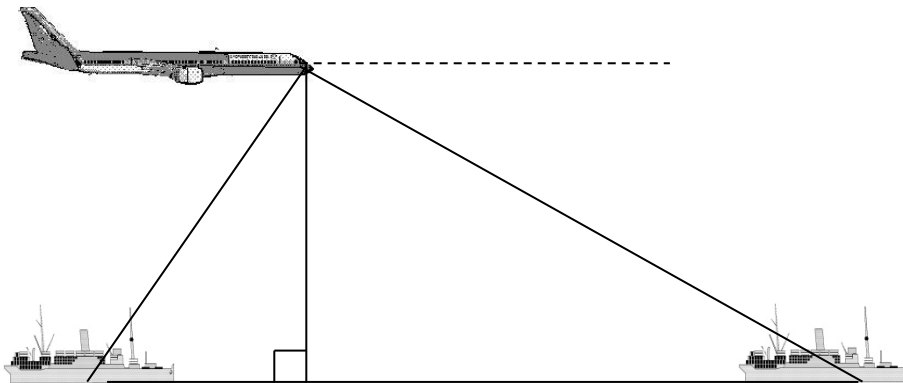
5.2.2 Find the size of angle T. (3)

5.3 Refer to the diagram below. An aircraft flies  $12,4\text{ km}$  above sea level and the pilot notices two ships, A and B, in the ocean. The one is directly in front of the aeroplane and the other one directly behind the aeroplane. He measures the angles of depression of the two ships at  $43^\circ$  to A and  $75^\circ$  to B.

5.3.1 According to the diagram, which ship is directly in front of him, A or B? (1)

5.3.2 Draw a figure and indicate all the information. Label the ships as A and B, and the aeroplane as C. (1)

5.3.3 Calculate the distance between the two ships (5)



[19]

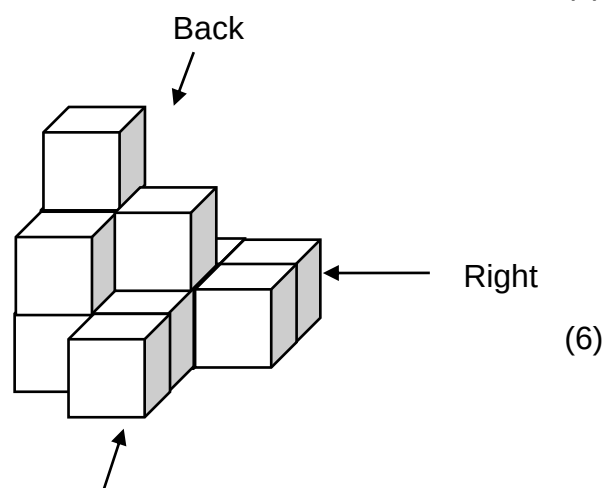
### Question 6

6.1 Draw the following objects on isometric dot paper (see Appendix B on page 35 of this tutorial letter):

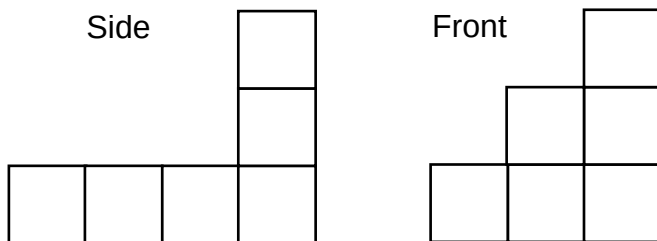
6.1.1 A hexagonal pyramid (3)

6.1.2 A triangular prism (3)

6.2 Draw the front, right and back view of the three dimensional object, consisting of cubes.



- 6.3 The side and front view of a three dimensional structure is given. Draw the possible structure



(3)

**[15]**

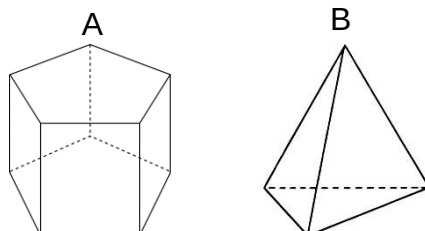
### Question 7

- 7.1 Draw the following objects on isometric dot paper (see page 35 of this tutorial letter)

7.1.1 a hexagonal prism (3)

7.1.2 rectangular pyramid (3)

- 7.2 You are given diagrams A and B representing two 3D objects. Study the diagrams and answer the questions that follow:



7.2.1 Give names for the 3D objects represented in diagrams A and B. (2)

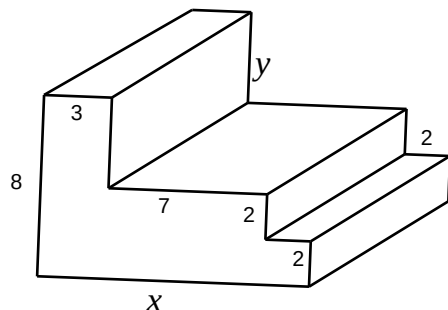
7.2.2 Does diagram A have rotational symmetry? Explain your answer. (3)

7.2.3 Name three properties of A (3)

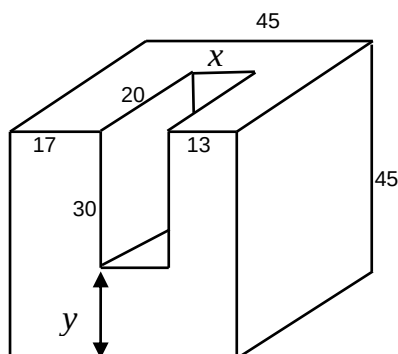
7.2.4 Draw the net of B. (3)

7.3 Calculate the values of  $x$  and  $y$ .

7.3.1



7.3.2

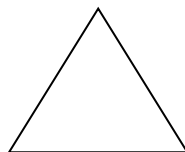
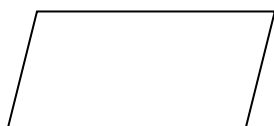
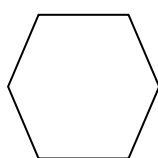


(4)

[21]

### Question 8

8.1 What is the order of rotational symmetry of each of the following figures? (3)



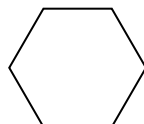
8.1.1 Redraw the figures in 9.1 in your script, and draw in the lines of symmetry of each where possible. (3)

8.2 Draw a tessellation pattern using each of the following shapes. You must have at least three rows for each pattern. (6)

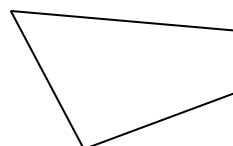
8.2.1



8.2.2



8.2.3

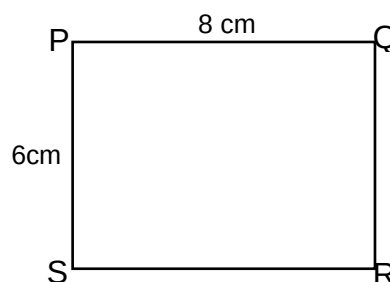


8.2.4 Describe in terms of transformations how the tessellation pattern in 8.2.2 was formed. (2)

(3)

8.3 Rectangle PQRS is given:

If you were to enlarge rectangle PQRS so that the side PS is 9 cm, how long would side PQ be in enlargement?

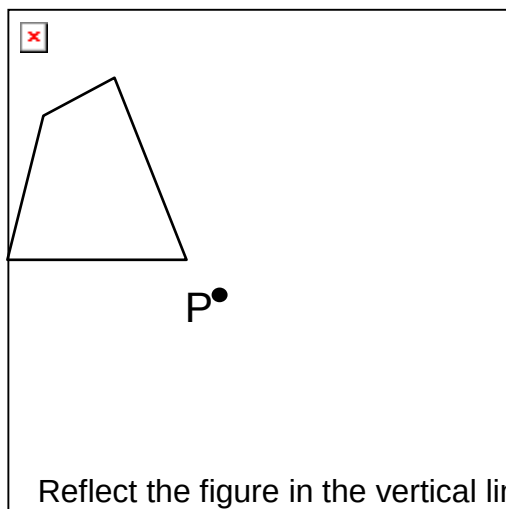


(2)

[19]

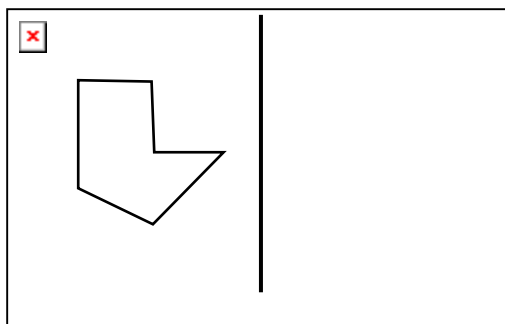
### Question 9

9.1 Rotate the figure  $90^\circ$  clockwise around the point P.



(3)

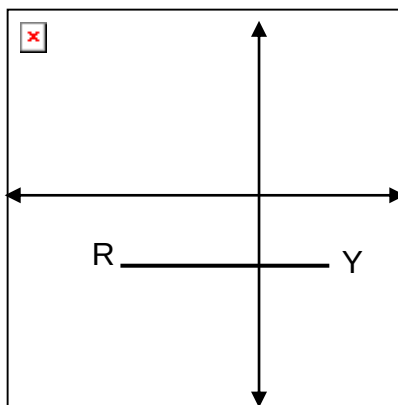
9.2 Reflect the figure in the vertical line.



(3)

9.3 Accurately redraw the following drawings in your answer book.

Locate point L so that  $\triangle LRY$  is an isosceles triangle. Can you find more than one answer?

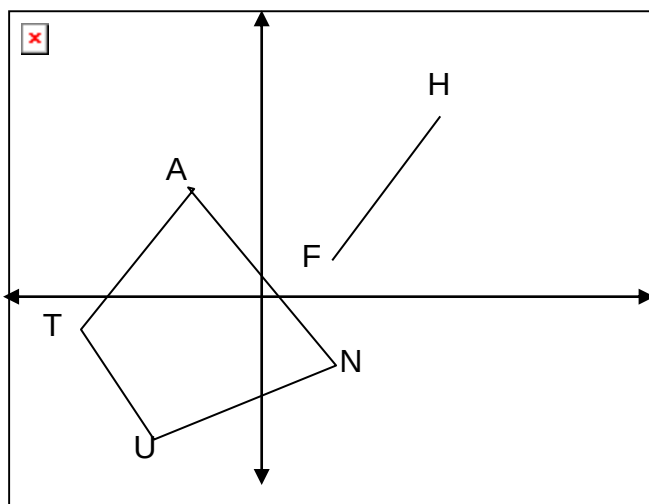


(3)

9.4

Quadrilateral TUNA is  
congruent to quadrilateral  
FISH

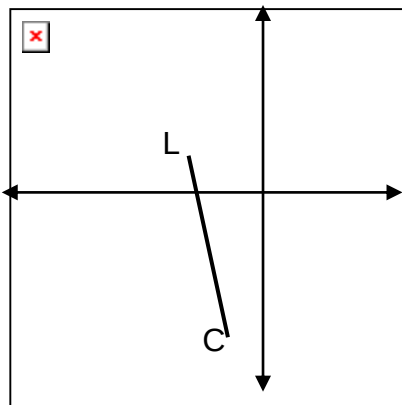
Draw FISH. The line segment  
FH is given on the drawing.



9.5

Locate point R so that  $\triangle CRL$  is  
an isosceles right triangle.

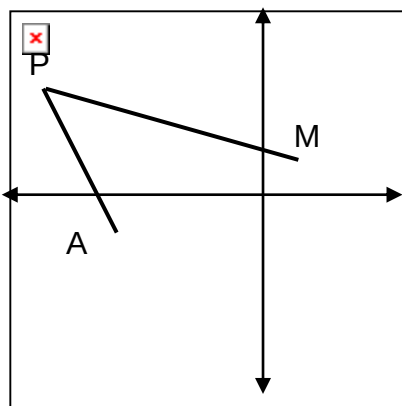
Can you find more than one  
answer?



(3)

9.6

PARM is a parallelogram.  
Complete the drawing



(3)

[18]

### Question 10

Read the chapter "Planning in the problem based classroom" to understand what is expected of the teacher in the "before", "during" and "after" stages of a problem based lesson.

Draw up a lesson plan on the topic of "prisms and pyramids" for grade 6 learners.

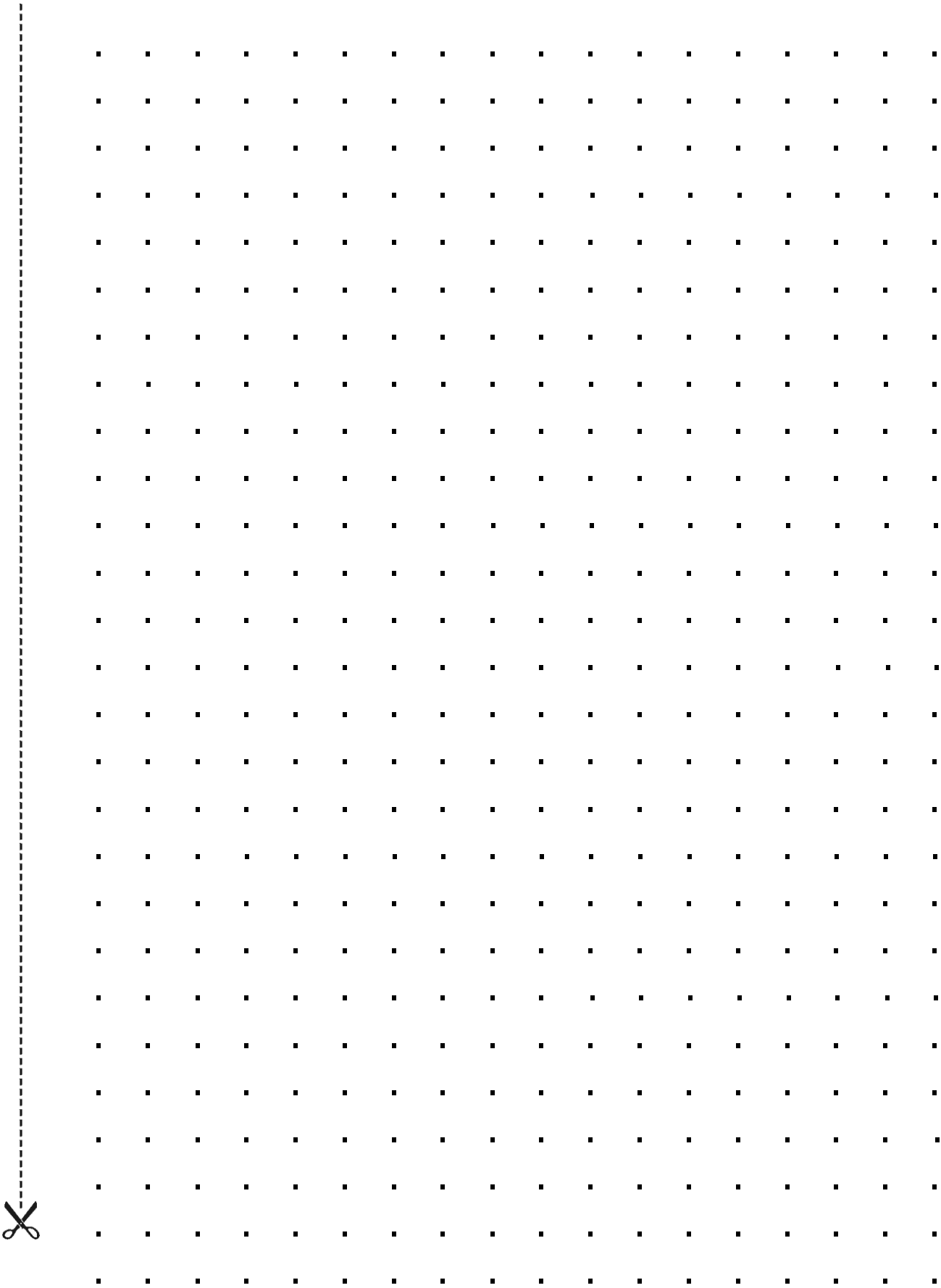
- |      |                                                                                                    |     |
|------|----------------------------------------------------------------------------------------------------|-----|
| 10.1 | Describe what you will do in each of the three stages.                                             | (6) |
| 10.2 | List at least three questions that you will pose to learners to provoke a constructive discussion. | (3) |
| 10.3 | Clearly describe what manipulatives you will use in the lesson.                                    | (2) |
| 10.4 | Design a worksheet and supply a memorandum.                                                        | (5) |

**[16]**

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**TOTAL: 162**

Appendix A: Square dot paper





**Appendix B:** Isometric dot paper