

RAMOTSHERE MOILOA SUB-DISTRICT

GRADE 9

TECHNOLOGY

JUNE 2019

MARKS: 120

DURATION: 2H30 min

NAME OF LEARNER: _____

CLASS: _____

INSTRUCTIONS

- 1. Answer all questions.**
- 2. Write neatly and legibly.**
- 3. All the answers should be written in the spaces provide in the question paper.**
- 4. Follow instructions promptly.**
- 5. All the drawings should be in pencil, neat and fully labelled.**
- 6. Coloured pencils may be used only for shading where such is required.**
- 7. This question paper consists of 16 pages including the answer sheets.**

QUESTION 1 (MULTIPLE CHOICE)

1. Four possible answers are given. Circle the letter of the correct one

- 1.1.1 A statement that describes how the designer intends to solve a problem is called...
- A. Design process
 - B. Evaluation
 - C. Communication
 - D. Design brief
- (1)
- 1.1.2 When a load acting on a structure is equally distributed, it is said to be...
- A. Stable
 - B. Bending
 - C. Even
 - D. Dynamic
- (1)
- 1.1.3 Hydraulics jack uses to operate.
- A. Gears
 - B. Fluids
 - C. Compressed gas
 - D. Fixed pulleys
- (1)
- 1.1.4 The type of force that is exerted on the bridge by the vehicles passing over the bridge...
- A. Stable force
 - B. Static force
 - C. Curving force
 - D. Dynamic force
- (1)
- 1.1.5 In Technology, drawing can be produced using enlarging scale, reducing scale or actual scale. Which one of the following is an enlarging scale?
- A. 1:2
 - B. 1:1
 - C. 1:0
 - D. 2: 1
- (1)
- 1.1.6 A dowel is described as a....
- A. Long round piece of wood.
 - B. Flexible structure.
 - C. Tube made of waste material.
 - D. Triangle frame structure.
- (1)

- 1.1.7 Which one of the following drawings shows 2D shape?
A. Oblique drawing.
B. Orthographic drawing. (1)
C. Isometric drawing.
D. Perspective drawing.
- 1.1.8 The idler gear ensures that the driver and the driven gears...
A. Operate without losses.
B. Rotate fast. (1)
C. Rotate in opposite directions.
D. Rotate in the same directions.
- 1.1.9 _____ states that PRESSURE exerted on one part of a HYDRAULIC SYSTEM, will be transferred equally in all directions to other parts of the system without any loss.
A. Pressure.
B. Pascal's principle/law. (1)
C. Hydraulic system.
D. Closed system.
- 1.1.10 A beam which is supported at one end only is known as a _____
A. Column.
B. Continuous supported beam. (1)
C. Lintel.
D. Cantilever.

[10]

1.2 Answer true or false and write answers on the space provided

- 1.2.1 Cam and Cleat are used as controlling mechanism in pulley ropes. _____ (1)
- 1.2.2 Worm and gear changes the axis of rotation in a gear systems. _____ (1)
- 1.2.3 A structure which is pulled apart is under compression force. _____ (1)
- 1.2.4 A liquid used by hydraulic jacks is oil. _____ (1)
- 1.2.5 The pillars of a bridge is under tensile stress. _____ (1)

[5]

1.3 Match the description of the gear in Column B to the correct gear in Column A. Write the letter of the description in Column B that correspond with the given gear Column A in Column C.

COLUMN A	COLUMN C	COLUMN B	
1.3.1 Spur gear		A. It has a straight teethed bar that moves in a straight line, when moved by a pinion gear.	(1)
1.3.2 Bevel gear		B. It is found between two gears and usually smaller than the two and rotates in opposite directions to the two gears.	(1)
1.3.3 Idler gear		C. It has one tooth which travels around the gear in the form of a screw.	(1)
1.3.4 Worm gear		D. It is shaped like a wheel. The teeth are cut into the rim and change rotary movement from gear to gear.	(1)
1.3.5 Rack and pinion gear		E. They are in the shape of a cone. They van transfer movement through 90^0	(1)

[5]

[20]

QUESTION 2

2.1 Define the following properties of materials with reference to construction materials.

2.1.1 Hardness _____
 _____ (1)

2.1.2 Stiffness _____
 _____ (1)

2.1.3 Flexibility _____
 _____ (1)

2.1.4 Corrosion resistance _____
 _____ (1)

2.1.5 Ductility _____
 _____ (1)

2.2 Differentiate between even and uneven loads

(2)

2.3 Choose the correct word from the frame given below and match with the following explanations.

Compression, tension, shear, bending, torsion

- 2.3.1 A combination of tension and compression. _____ (1)
- 2.3.2 Stretch the material by pulling its ends apart. _____ (1)
- 2.3.3 Twist a material by turning the ends in opposite directions. _____ (1)
- 2.3.4 Crush a material by squeezing it together. _____ (1)
- 2.3.5 Tear material by pushing it in opposite directions. _____ (1)

[12]

QUESTION 3

3. Read the scenario below and answer the questions that follow.

SCENARIO

Nelson Mandela High school has a new community hall. A staircase and wheelchair ramp is needed for the stage in the hall. The principal made a list of specifications that should be kept in mind when designing the staircase and the wheelchair ramp. The specifications are as follows:

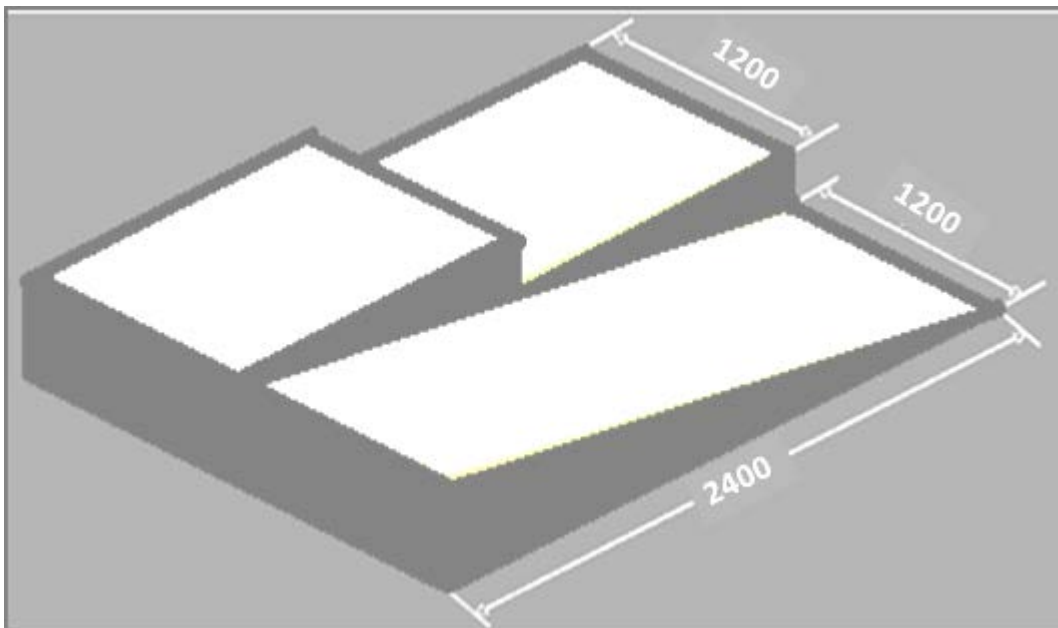
- The stairs and ramp must be made in two units that are movable.
- The unit should fit in front of the stage so that people can walk onto the stage and a wheelchair can go up and down the ramp.
- The stage is 600 mm high.
- The stairs should be wide enough for two people to move side by side at the same time; 1 000 mm.
- There should be 3 steps of 200 mm high each.
- The flat part (riser) of each step is 600 mm long.
- The ramp should be wide enough for one wheelchair, 1 000 mm.
- The base of the ramp should be 1 800 mm long.

3.1 Write down a design brief for a solution to the problem identified in the scenario above.

(2)

3.2 Neatly draw a free hand, three-dimensional sketch of the combined staircase and ramp (include dimensions in the correct places on your drawing). (9)

3.3 The drawing below shows another design which was submitted for the above scenario and specifications.



Compare the drawing with the specifications that were not met in the above drawing.

(3)

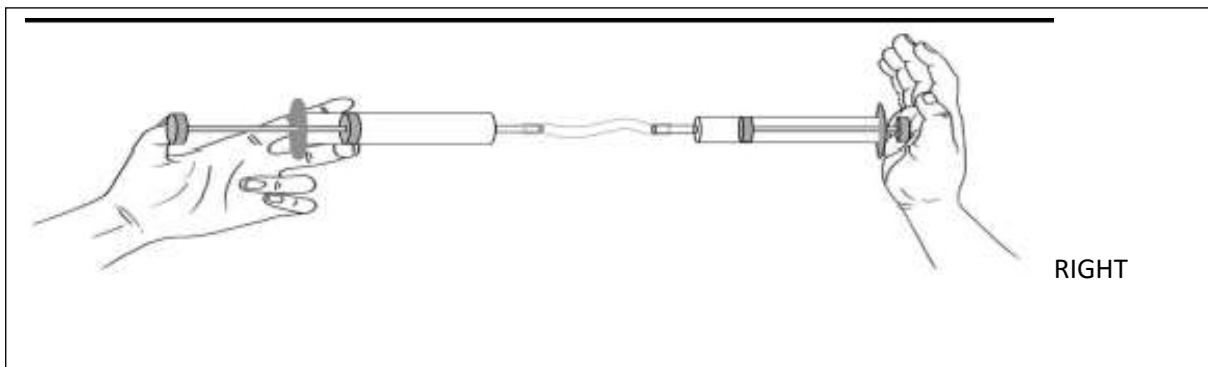
[14]

QUESTION 4

4.1 What is the main difference between hydraulics and pneumatics?

(2)

4.2 Use the diagram below to answer the following question.



Will the pressure on the hand be the same with a pneumatic system as with a hydraulic system?
Explain your answer.

(3)

4.3 Why is hydraulic oil used in a hydraulic system?

(2)

4.4 Briefly describe the first rule of hydraulics.

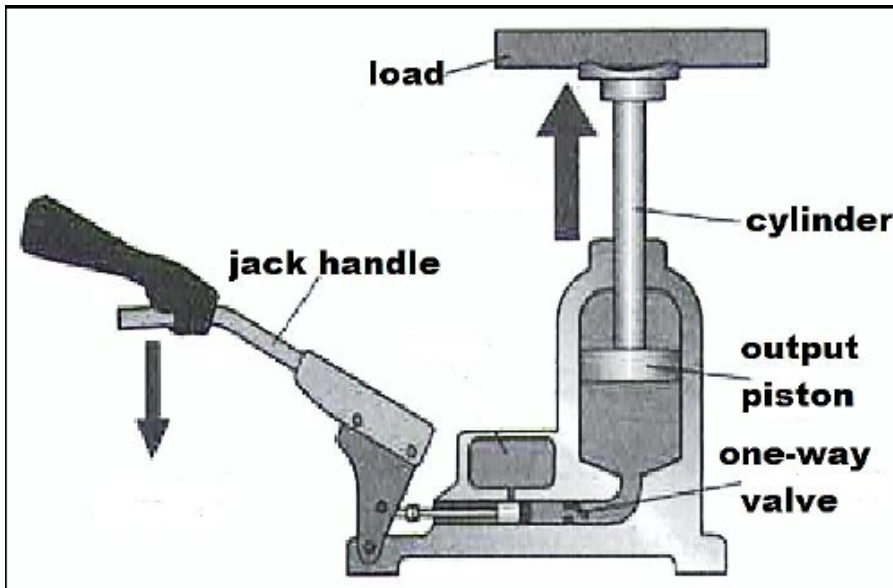
(3)

4.5 Explain Pascal's Principle.

(3)

QUESTION 5

5. A DIAGRAM OF A HYDRAULIC JACK



5.1 What is a hydraulic system?

_____ (2)

5.2 Draw a system diagram that describes the way a hydraulic jack works. (6)

INPUT	PROCESS	OUTPUT

5.3 A car lift hydraulic system is used to lift a car of 2 500 kg. An input force of 5000 N is applied to the piston. What is the Mechanical advantage of this car lift? (Hint: Remember to convert to SI units)

(4)

[12]

QUESTION 6

6.1 Answer the following questions

6.1.1 What is a pulley?

_____ (1)

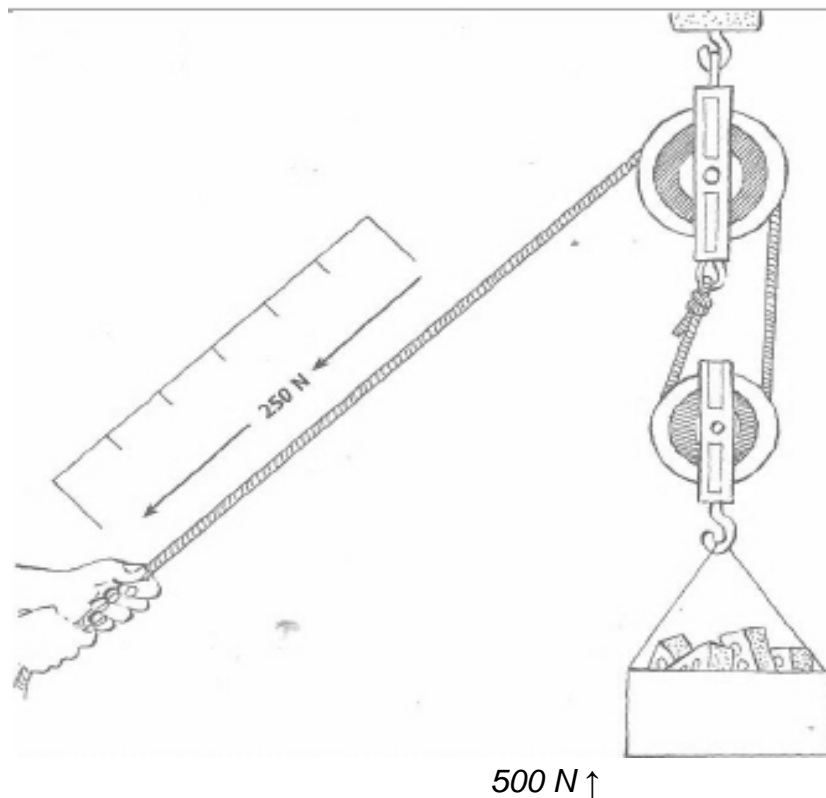
6.1.2 What is a compound pulley system?

_____ (1)

6.1.3 In what way does a pulley system make work easier?

_____ (2)

6.2 The following diagram shows a person using a compound pulley system to lift the bricks.



A COMPOUND PULLEY SYSTEM

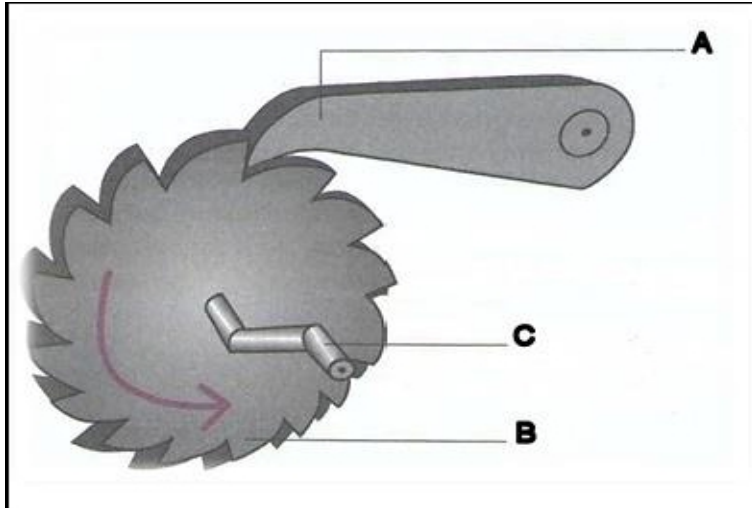
6.2.1 Calculate the Mechanical Advantage of this pulley system (3)

FORMULA: Mechanical Advantage= _____

[07]

QUESTION 7

7.1 The mechanism below is an important control device used in many systems.



7.1.1 Name the parts labelled A, B and C

A _____

B _____

C _____

(3)

7.1.2 What is the purpose of part C in the above mechanism?

(1)

7.1.3 Calculate the Mechanical Advantage if the load is 600N and the effort is 150N

(3)

7.1.4 Give an example of where each of the following components are used in real life

A. Ratchet and Pawl _____

B. Cleat _____

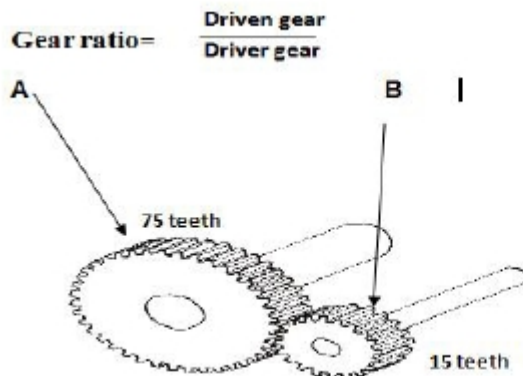
C. One-way valve _____

(3)

[10]

QUESTION 8

8. GEAR A and B are shown in the figure below. Gear A is driven



8.1 Use the formula given above to calculate the gear ratio in the above gear train.

(3)

8.2 Is the system increasing or decreasing the speed? Give a reason for your answer.

(2)

8.3 If gear A rotates one revolution, how many revolutions will gear B rotate?

(2)

8.4 If the driver gear rotates clockwise how would the driven gear rotate?

(1)

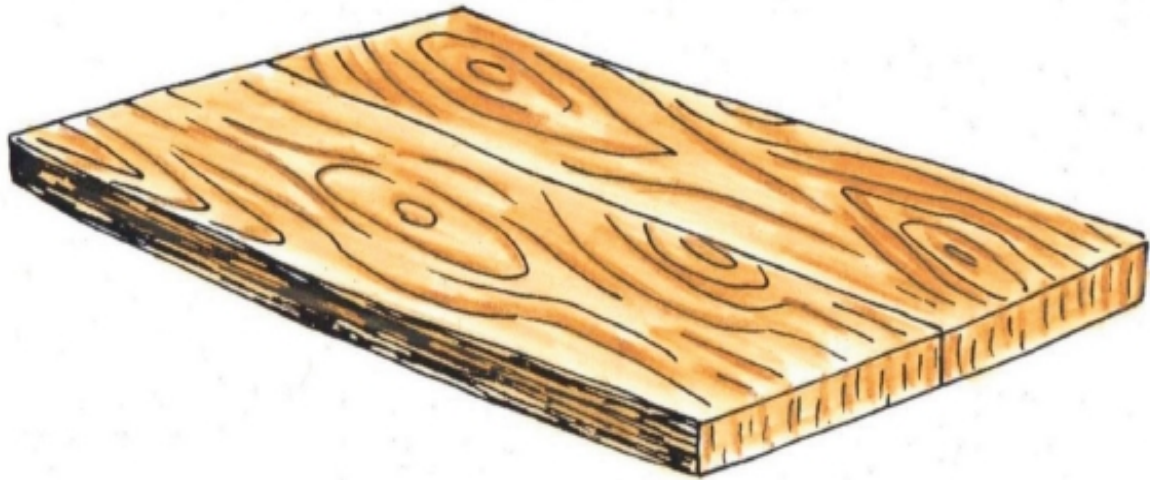
8.5 Explain how you would make gear A and gear B to rotate in the same direction.

(2)

[10]

QUESTION 9

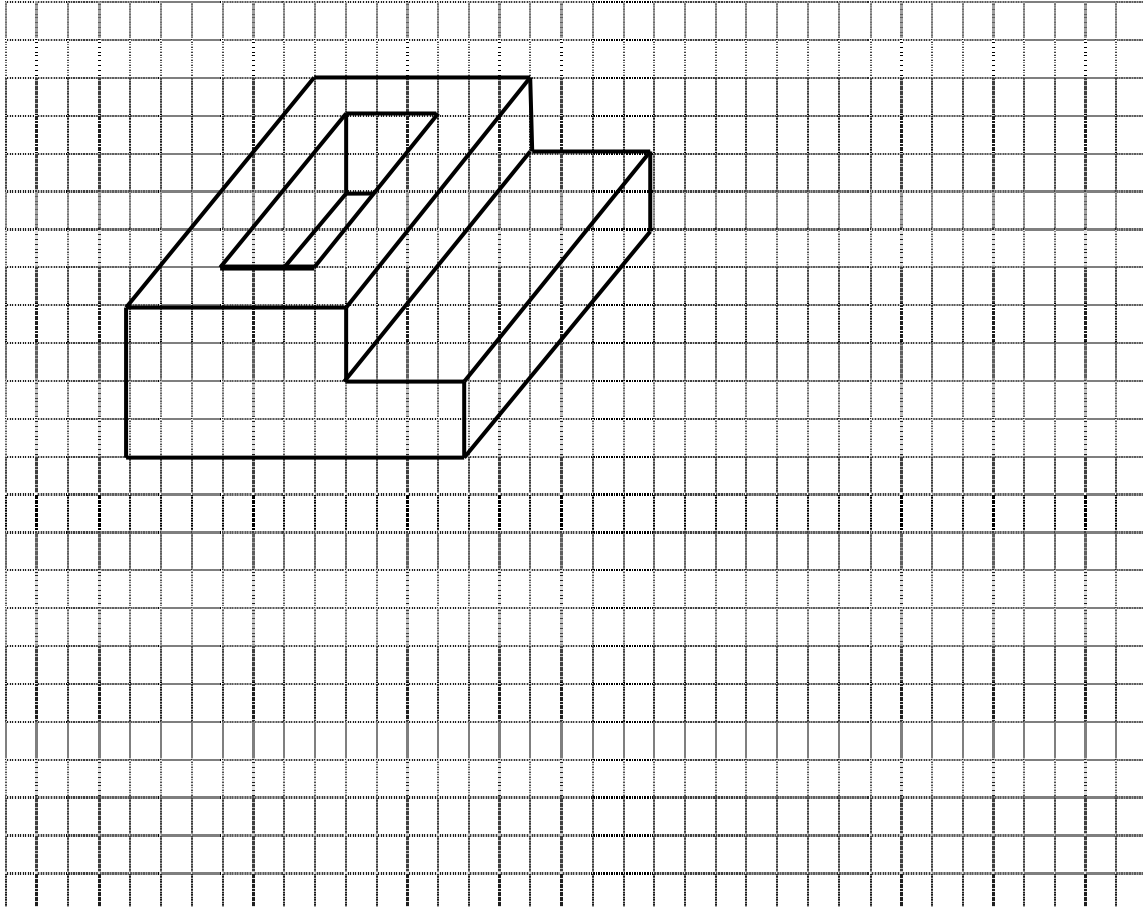
A wooden block is given in isometric. Use the Answer Sheet to draw an artistic Single point perspective presentation of the wooden block.



Enhance the drawing by showing TEXTURE OF WOOD GRAIN, COLOUR and SHADOWS. (8)

QUESTION 10

10.1 Draw an object below in First Angle Orthographic projection using the grid provided. Show the Top view, Front view and the Left view. (8)

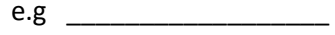

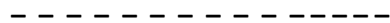



NB: Dimensions on the grid paper (1Block: 10 mm)

RUBRIC FOR QUESTION 10

CRITERIA	TOTAL MARK	OBTAINED MARKS
CORRECT PLACEMENT OF VIEWS	2	
CORRECTNESS OF FRONT VIEW	2	
CORRECTNESS OF SIDE VIEW	2	
CORRECTNESS TOP VIEW	2	

10.2 Give the names and descriptions of the following line types as used on drawings. The answers should be written in the table as in the provided per example. (6)

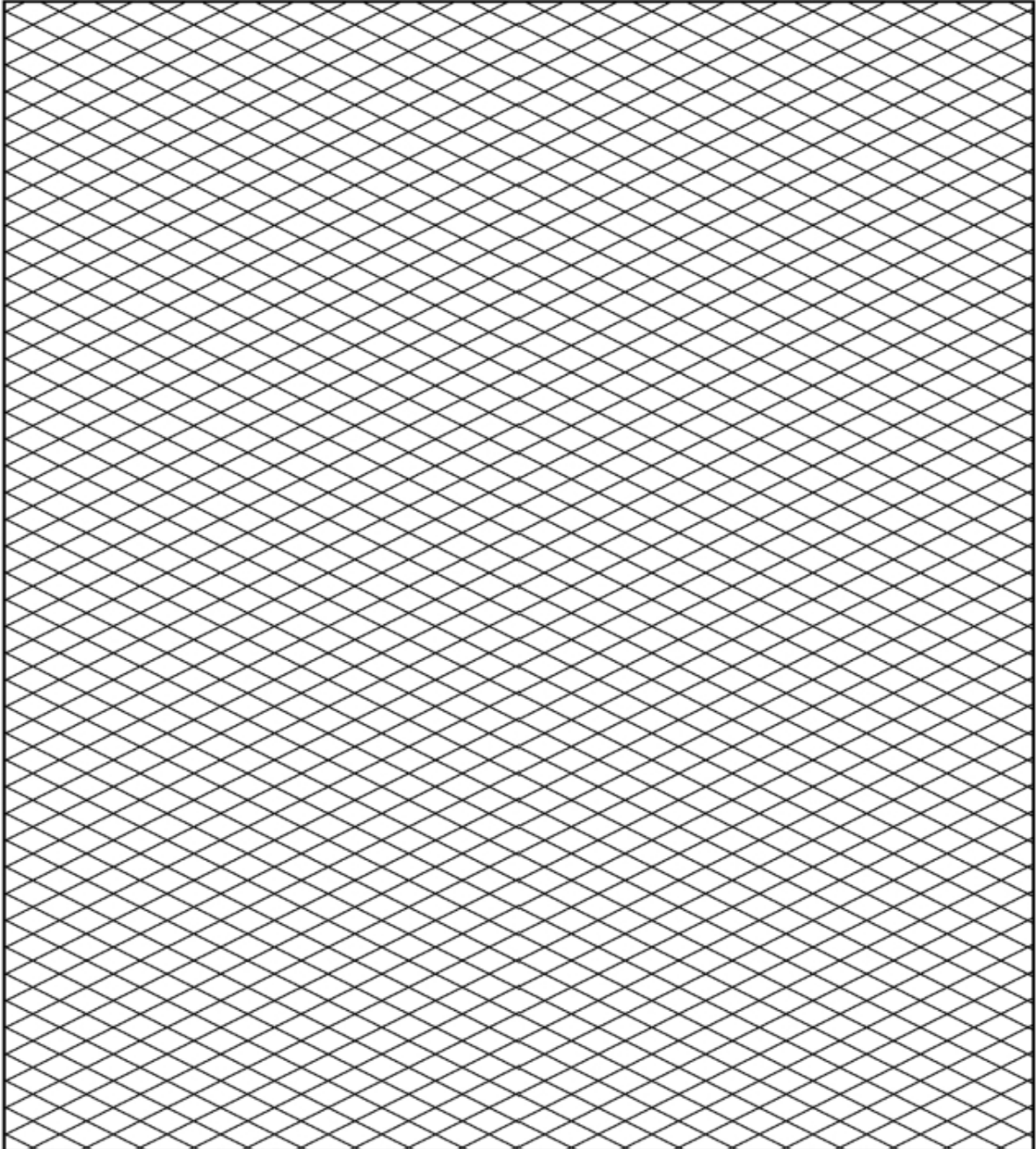
Line drawing	Name	Description/Property
e.g 	Construction line	Very thin and continuous
		
		
		

[14]

GRAND TOTAL: 120 MARKS

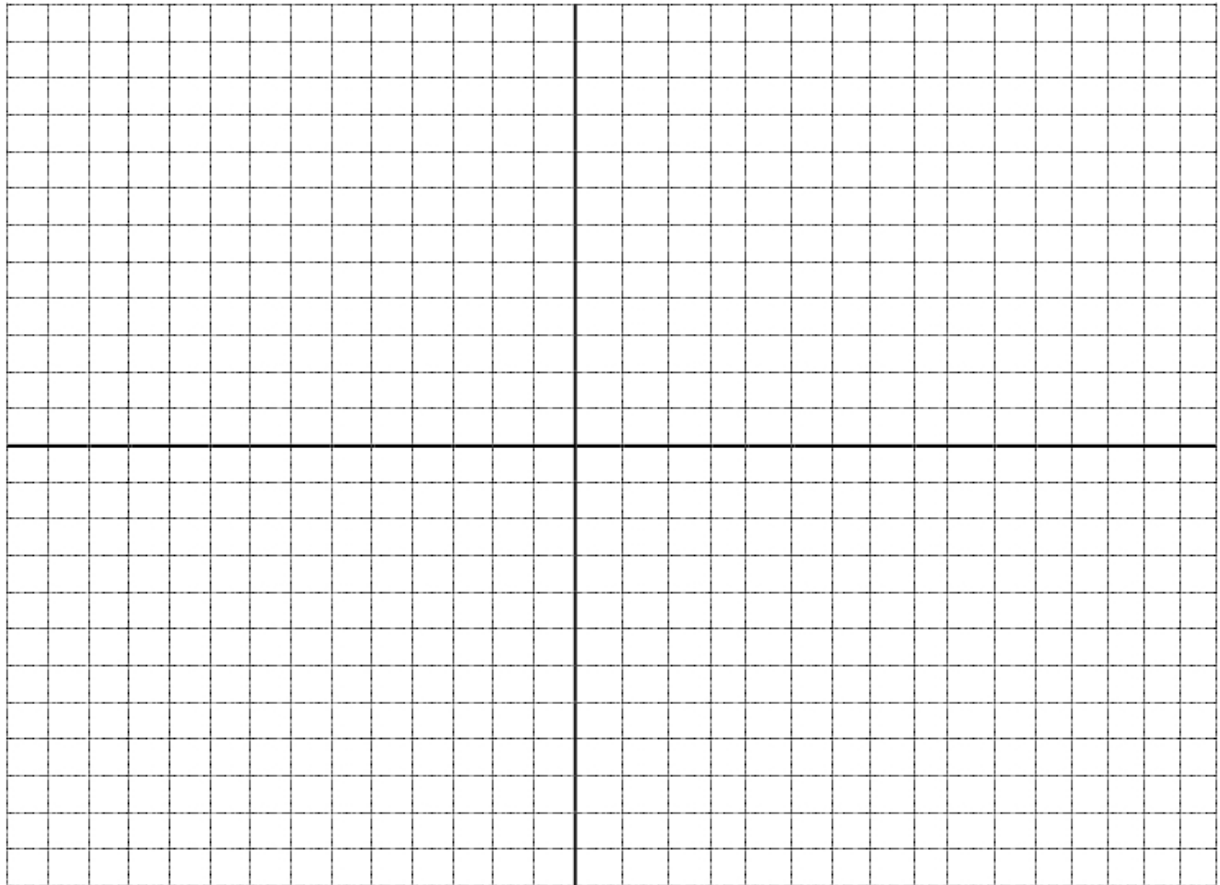
QUESTION 3.2 ANSWER SHEET

NAME: _____ CLASS: _____



ANSWER SHEET: QUESTION 10.1

NAME: _____ SCHOOL: _____



NAME OF LEARNER: _____

CLASS : _____

QUESTION 9: ANSWER SHEET

