Technology

June 2015
Grade 9

Examiner: Mr S Griffiths

Moderator: Mrs Hamilton

Instructions to candidates:

This paper consists of 7 pages.

Answer all questions on the paper provided.

Write your teachers name on the top of your answer paper.

Number your answers correctly according to the numbers used in this question paper.

Draw double margins.

It is in your best interest to set your work out neatly and legibly.

Total: 135 marks

Question 1Multiple choice questions

Answer these questions in the spaces provided in your answer booklet.

1.1 The strongest shape to use when making a structure is...

a A rectangle
b A triangle
c A circle
d A hexagon (1)

1.2 The classroom door handle experiences a _____ force when the door is opened

a Bending
b Tension
c Torsion
d Compressive (1)

1.3 A bridge that is supported by cables connected to towers is a _____ bridge

a Cantilever
b arch
c Steel truss
d Cable stayed (1)

1.4 The guy rope of a tent will be under a _____ force

a Bending
b Tension
c Torsion
d Compressive (1)

1.5 If a driver gear with 12 teeth turns clockwise while it is meshed with a driven gear with 24 teeth, the driven gear will...

a Turn in a clockwise direction at double the speed of the driver gear.
b Turn in a clockwise direction at half of the speed of the driver gear.
c Turn in an anticlockwise direction at double the speed of the driver gear.
d Turn in an anticlockwise direction at half of the speed of the driver gear. (1)

1.6 Which is not a part of hydraulic systems

a Oil
b A cylinder
c A pipe
d air (1)

1.7 A disadvantage of a pneumatic system is...

a It is more precise
b It is noisy
c It is very slow
d None of the above (1)

1.8 A ratchet and pawl are used...

a To slow down movement
b To change direction
c To only allow movement in 1 direction
d Release pressure in a hydraulic jack (1)

1.9 a single wheel moveable pulley has a mechanical advantage of

a 1
b 2
c 0
d -1 (1)

1.10 if a hydraulic machine has a mechanical advantage of 5, and in input force of 25, then the output force is

a 5N
b 30N
c 125N
d 20N

[10]

Question 2

Match word in column A with the statement in column B. Write your answer in the space provided in the answer booklet.

Column A		Column B	
2.1	Strut	A	A vertical member with a load resting on top.
2.2	Column	B	A wheel with a groove
2.3	Stay	C	A gear system used to transfer power through 90°
2.4	Pulley	D	A mechanism used to convert rotary motion into reciprocating motion.
2.5	Crank	E	A mechanism used to convert rotary movement into linear movement.
2.6	Worm gear	F	A long cable connected to the structure and the ground to prevent the structure from collapsing
2.7	Cleat	G	Used to wind up the window in a car
2.8	Bevel gear	H	A member under compression
2.9	Cam	I	A gear used to slow down the speed of rotation.
2.10	Rack and pinion	J	A mechanism used to hold rope.

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Question 3

State whether the following statements are true or false. Put a cross (X) in the correct block in your answer booklet.

3.1 If a drawing shows a scale of 1:2, it means that the drawing has been drawn bigger than it is in real life.

3.2 The mechanical advantage of a compound pulley system reduces the force needed to lift a load and increases the distance that the rope needs to be pulled.

3.3 A pneumatic system uses oil to do work.

3.4 Suspension bridges have the bridge deck connected securely to the towers.

3.5 Alpine railways use the rack and pinion system to move them up mountains.

[5]

Question 4

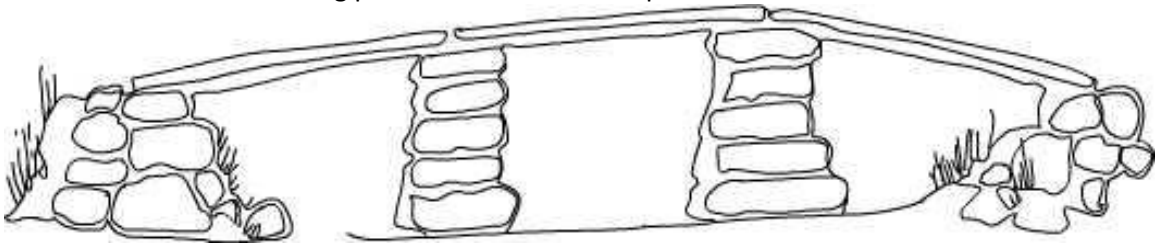
Read the statements below and classify them into static (stationary) or dynamic (moving loads and even and uneven loads). Use an X to record your answer in the spaces provided on your answer booklet.

	Static	Dynamic	Even	Uneven
Sitting on a chair				
Rocking on a chair				
Standing on a trampoline				
Bouncing on a trampoline				
The brickwork above a lintel				
A car driving over a bridge				
A bouncing ball				
A bus, car and taxi crossing a bridge				
Heavy and light persons on see-saw				
Person walking up one side of see-saw				
Standing at end of diving board				
Diving off board				
Man lifting child on bicycle				
Walking across suspension bridge				

[28]

Question 5

5.1 Look at the following picture and answer the questions that follow.



a Name this simple structure, which is over 1000 years old. (2)

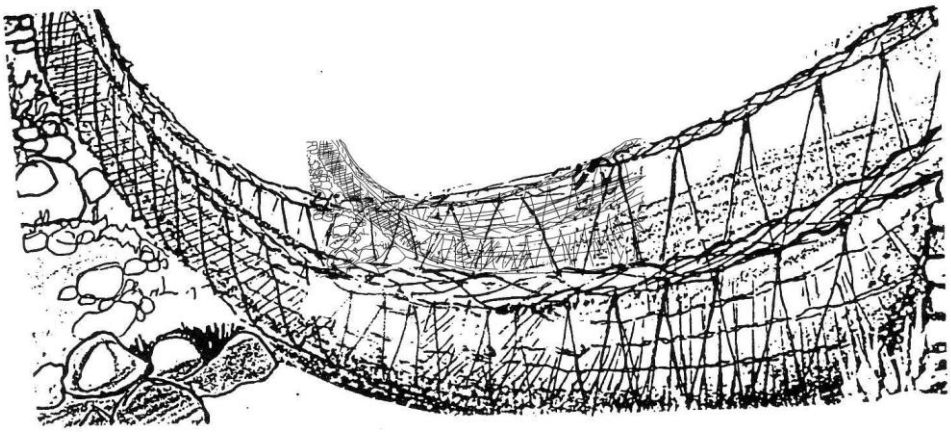
b What was the need that led to its design? (2)

c What material was used? (2)

d In what way is it effective in meeting the need? (2)

e What are its limitations? (2)

5.2 There is another kind of bridge, which is different from the beam bridge, and that is the suspension bridge.
Suspension bridges are suspended between two opposite sides. The earliest suspension bridges were made from vines and wooden slats.



a Why do you think the indigenous people used these materials? (2)
b Where would you expect to find this type of bridge? (2)
c What would be the advantages? (2)
d What would be the disadvantages? (2)
e Name one famous bridge in San Francisco that is a modern suspension bridge (2)

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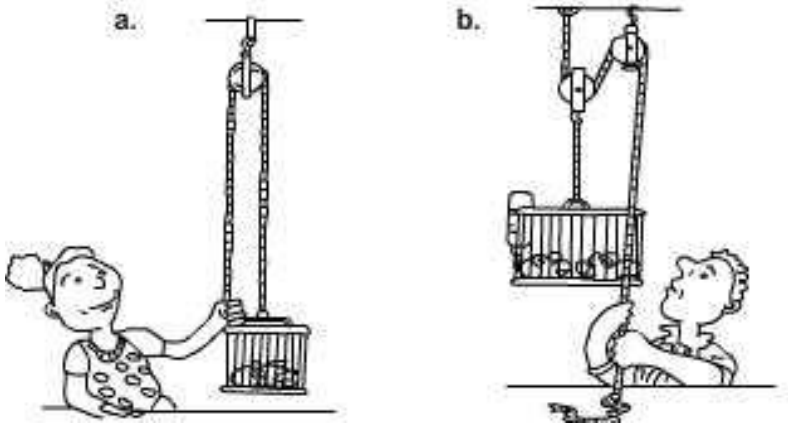
Question 6

Study the pictures below and answer the questions that follow.



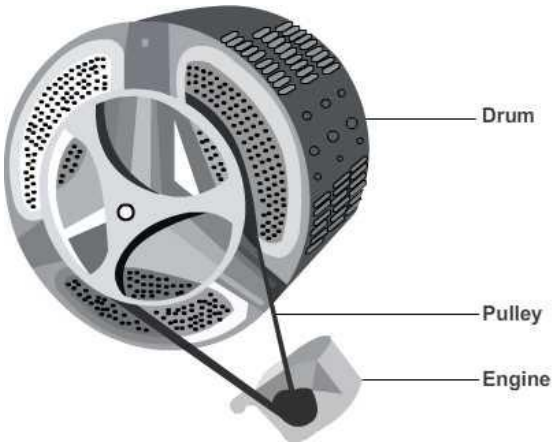
7.1 Name the mechanism in picture a. (1)

7.2 Name the mechanism in picture b. (1)

[2]

Question 7

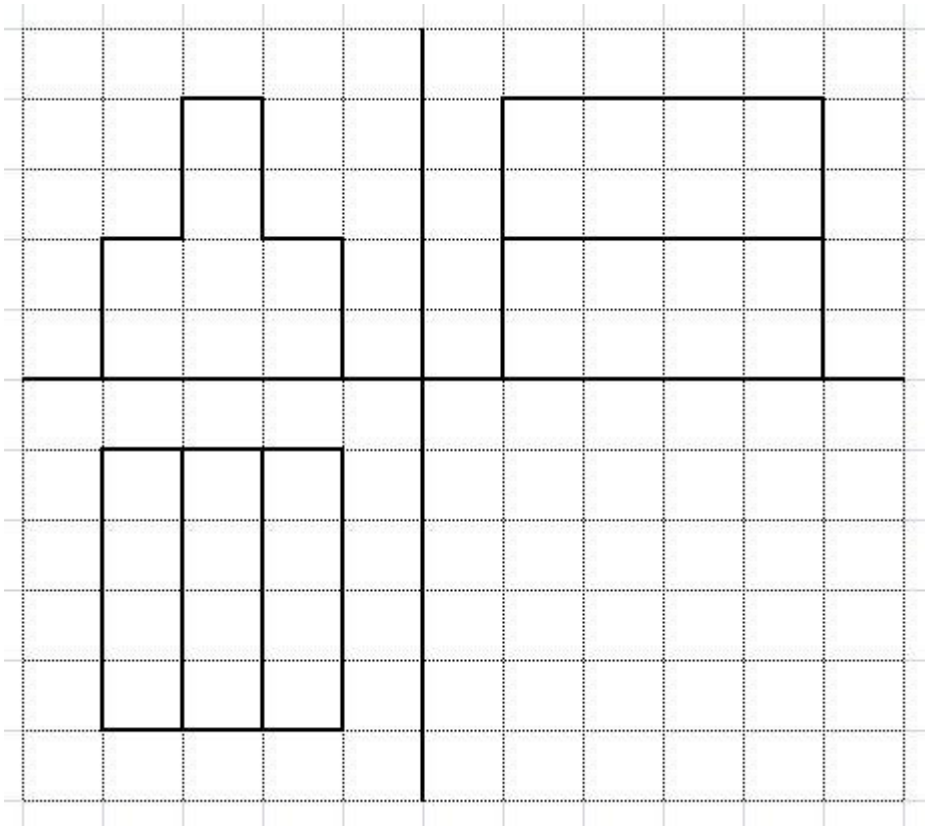
Look at the following picture and then draw a systems diagram to explain the input, process and output of the system.



[9]

Question 8

Redraw the following orthographic drawing into isometric. Use the grid provided in your answer booklet.



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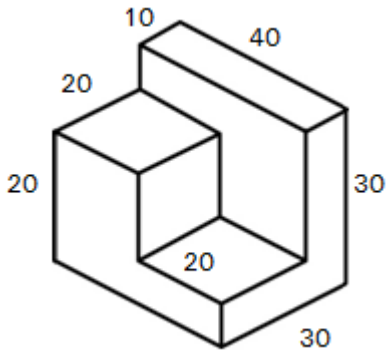
Question 9

Redraw the following isometric projection in first angle orthographic projection.



[15]

Question 10

Read the following article and then answer the questions that follow

During a recent storm in the Waterfall area, the Sunbeam Pre-School was severely damaged. When the principal and staff members took stock of what was left, they realised that there were hardly any toys left for the children to play with. The pre-school is in a very poor community, so they cannot rely on the parents to donate and sponsor the school.

The principal of Sunbeam Pre-School has approached the principal of Hillcrest High School for help. The principal knows that Hillcrest High Schools Grade 9 technology learners have the necessary skills and commitment to help the Sunbeam Pre-School.

The Grade 9 learners decided they were going to design and make interesting and special toys for the pre-school. They also decided that the toys should have some moveable part/s and that there should be a variety of toys suitable for boys and girls. A gear system would be used to enable the toys to move.

6.1	Identify the problem or need which is faced by Sunbeam Pre-School.	(2)
6.2	Identify 3 different possible toys that Hillcrest High Schools students could make.	(3)
6.3	Briefly explain what is meant by the term "gear system"	(3)
6.4	List 3 specifications for the toy.	(3)
6.5	List 3 constraints for the toy.	(3)
6.6	Draw a design of a toy that you would make. You should include appropriate labels.	(10)
		[24]

Total:135 marks