Candidate Number	Candidate Number	Candidate Name

DESIGN AND TECHNOLOGY HIGHER LEVEL

8340/1

PAPER 1

2 hours

Marks 100

2020

Additional Material: A3 drawing paper for Question 11 only
Non-programmable calculator
Standard drawing equipment

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page and on all separate answer sheets used.
- Write in dark blue or black pen.
- You may use a soft pencil for any rough work, diagrams or graphs.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.
- You may use a non-programmable calculator.
- The number of marks is given in brackets [ ] at the end of each question or part question.

Part A

- Answer **all** questions.
- Write your answers in the spaces provided on the Question Paper.
- You should spend about 30 minutes on **Part A**.

Part B

- Answer **one** question **only**.
- **Question 11 (a) (b) (c)** should be answered on the separate drawing paper provided.
- **Question 11 (d)** should be answered on the separate A3 drawing paper provided.
- At the end of the examination staple your A3 work to this Question Paper.
- **Questions 12** and **13** should be answered in the spaces provided on the Question Paper.

For Examiner's Use	
Part A	
Part B 11	.....
12	.....
13	.....
TOTAL	

Marker	
Checker	

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Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

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Part A

Answer **all** questions from **Part A** in the spaces provided.

1 Fig. 1 shows cropspraying which is chemical technology.

Chemical technology: crop spraying

Fig. 1

(a) State ways in which this technology is beneficial.

.....

.....

.....

..... [2]

(b) State ways in which this technology will be harmful.

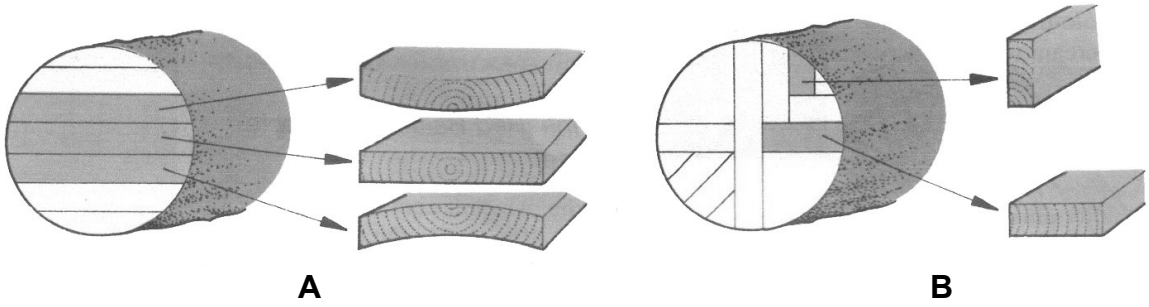
.....

.....

.....

..... [2]

2 Fig. 2 shows two methods of coverting a log.



A **B**

Fig. 2

(a) Identify the methods **A** and **B**.

A .....

B ..... [2]

(b) Why is method **B** more expensive than method **A** and yet it is most preferred on the market?

.....

.....

.....

.....

.....

..... [3]

(c) Draw **two** neat sketches to differentiate between stoutheart plywood and multiply wood.

[3]

3 Fig. 3 shows a vehicle from which the bumpers are injection moulded in polypropylene.

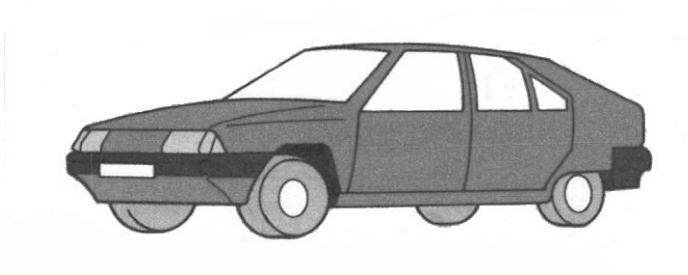


Fig. 3

(a) Give the properties that make this material particularly suitable for this product.

.....

.....

.....

.....

.....

..... [3]

(b) Why is injection moulding unlikely to be used for short production runs?

.....

.....

.....

..... [2]

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4 Fig. 4 shows a high tensile bolt cutter assembled from several component parts.

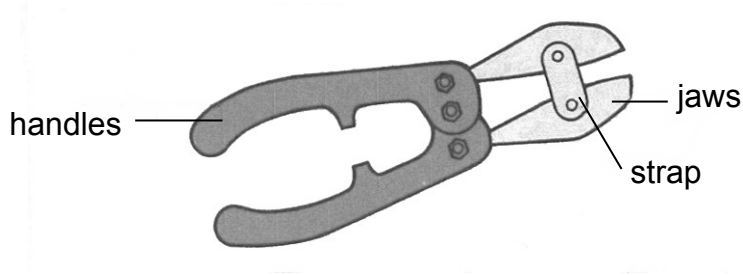


Fig. 4

(a) Which parts do you think were dropforged?

..... [1]

(b) Which components would be made from high carbon steel, and why?

.....

.....

.....

..... [2]

5 **(a)** Define *"aesthetics"*.

.....

.....

.....

..... [2]

(b) Name **three** elements of visual design

.....

.....

..... [3]

6 Fig. 5 shows a diagram of a structure under load.

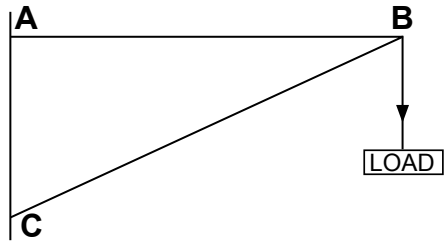


Fig. 5

Identify the types of force acting on **AB** and **BC** and explain the result of each.

AB .....

.....

.....

..... [2]

BC .....

.....

.....

..... [2]

7 Fig. 6 shows a diagram of a see-saw with forces acting upon it.

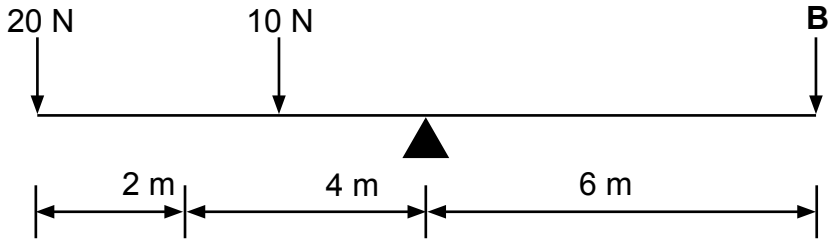
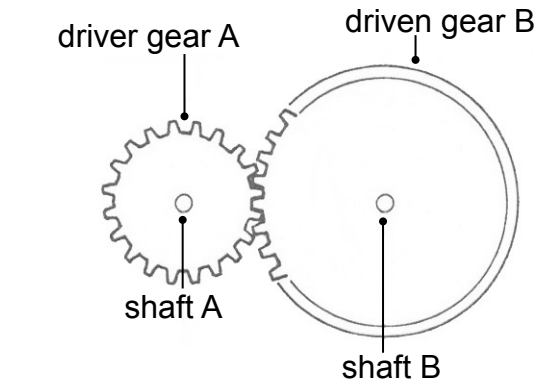


Fig. 6

Calculate the force that must be applied at **B** to balance the see-saw.

[4]

8 Fig. 7 shows a simple gear train. Driver gear A has 20 teeth. When shaft A is rotated 10 times, shaft B rotates 5 times.



Simple gear train

Fig. 7

(a) How many teeth has gear B?

..... [1]

(b) What is the gear ration of the system?

..... [1]

9 State the equation for Ohm's Law.

.....

.....

.....

..... [2]

10 Differentiate between the three systems.

(a) Monostable

..... [1]

(b) Bistable

..... [1]

(c) Astable

..... [1]

[40]

Part B

Answer **one** question from **Part B**.

11 Design Communication

Answer the whole of this question on separate A3 drawing paper.

(a) Fig. 8 shows an explode isometriic view of a "TOOLMAKERS CLAMP"

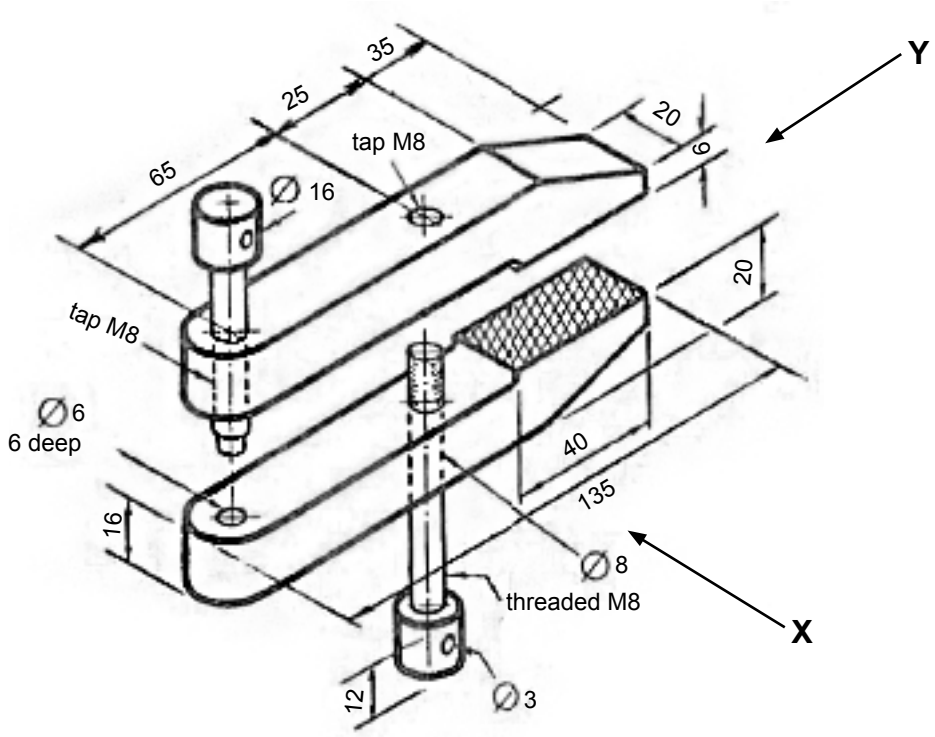


Fig. 8

Draw to a scale 1:1 in third angle orthographic projection:

(i) Draw the front view as seen from X, with the jaws clamping a rod of 12mmØ and 50mm long. [8]

(ii) draw the right side view as seen from Y. [8]

(iii) show all hidden details. [6]

(b) Insert **four** dimensions according to the SANS code. [4]

(c) In the centre beneath your drawing, print write the title "TOOLMAKERS CLAMP" (in guidelines of 4 mm to 6 mm) and the projection symbol. [4]

(d) Fig. 9 shows a front view of a truncated cone in third angle orthographic projection.

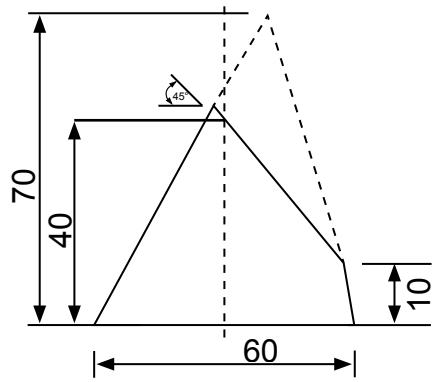


Fig. 9

Draw to a scale 1:1:

(i) the front view [4]

(ii) the top view [6]

(iii) the true shape of the cutting plane [6]

(iv) the development of the cone [8]

(v) show all the projection lines [3]

(vi) marks will be allocated for quality and accuracy [3]

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12 Resistant Materials

Write your answers in the spaces provided

(a) Fig. 10 shows a wood turning lathe.

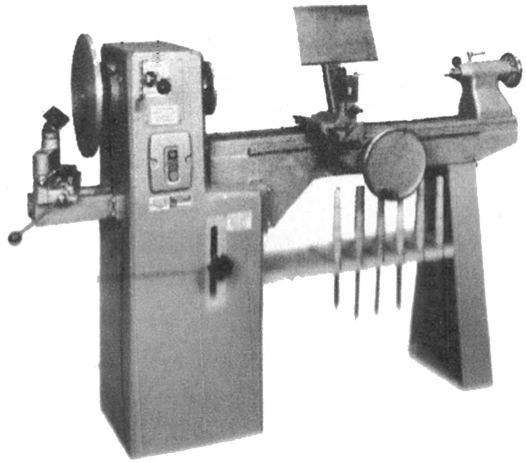


Fig. 10

(i) Describe **two** safety rules to be applied when working on this machine.

.....

.....

.....

..... [2]

(ii) Name the **two** types of turning that can be done on this machine.

.....

.....

.....

..... [2]

(iii) Explain the preparation procedures of both types of turning, from the wood to the machine.

Type: .....

.....

.....

..... [4]

Type: .....

.....

.....

..... [4]

(b) Fig. 11 shows a section through a tree trunk.

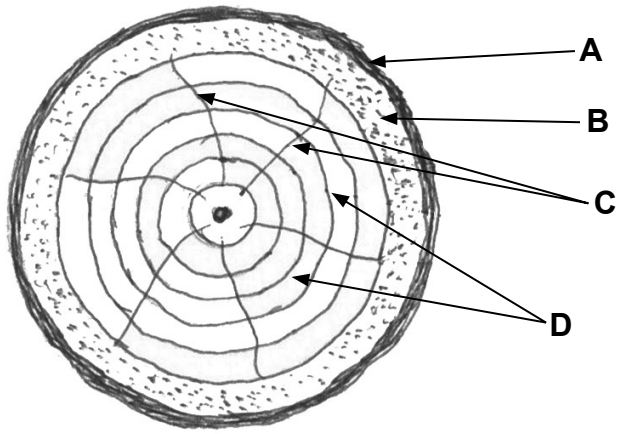


Fig. 11

(i) Identify **A** and **C**.

A..... [1]

C..... [1]

(ii) What are the functions of **B** and **D**?

B.....

..... [2]

D.....

..... [2]

(iii) The seasoning of wood is a very important factor or process in the wood industry. Explain the importance of "low water content".

.....

.....

.....

..... [2]

(c) Fig. 12 shows a pushchair fabricated from stainless steel tubing.

Fig. 12

(i) What properties make stainless steel particularly suitable for this product?

.....

.....

.....

.....

.....

..... [3]

(ii) Why was tubing used instead of solid bar?

.....

..... [2]

(iii) What would be the disadvantage of using mildsteel for this product?

.....

.....

.....

.....

.....

..... [3]

(iv) Some pushchairs are made from aluminium. State **two** advantages and **two** disadvantages of using aluminium for this product.

Advantages .....

.....

.....

..... [2]

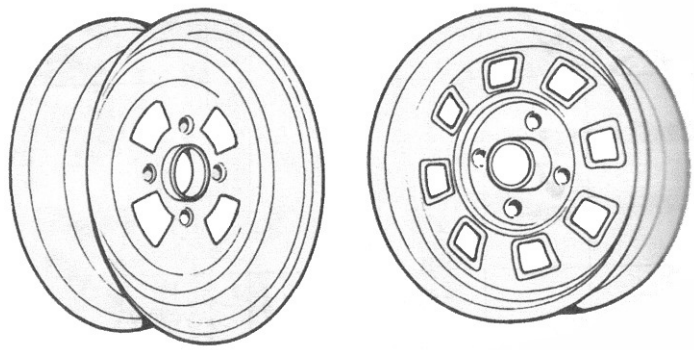
Disadvantages .....

.....

.....

..... [2]

(d) Road wheels on some cars are frabricated from mildsteel pressings. Others are cast in aluminium alloys.
Fig. 13 shows two types of car wheel.



pressed steel alloy casting

Fig. 13

(i) State **three** reasons for choosing aluminium alloy for making car wheel.

.....

.....

.....

.....

.....

..... [3]

(ii) Why are the wheel on most cars made from steel pressing?

.....

..... [2]

(iii) State the process which imports hardness to the steel and helps to add rigidity to the product.

.....

..... [1]

(iv) Briefly describe the process of "press forming".

.....

.....

.....

.....

.....

.....

.....

..... [4]

(e) (i) Give the name of small molecules such as ethane, that link when producing polythene.

.....

..... [1]

(ii) State the name of the process of joining molecules.

.....

..... [1]

(iii) What are the products called of the process in **(ii)**?

.....

..... [1]

(f) Fig.14 shows a garden hose made from PVC.

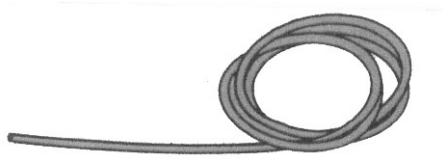


Fig. 14

(i) What method would be used to make the garden hose?

.....

..... [1]

(ii) Breifly describe the process in (i).

.....

.....

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.....

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.....

..... [5]

(g) Fig. 15 shows a saucepan from which the handle was compression moulded in urea formaldehyde.

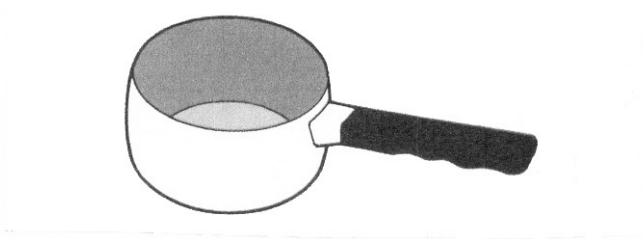

Fig. 15

(i) Is urea formaldehyde a thermoplastic or thermosetting plastic?

.....

..... [1]

(ii) Why is this material particularly well suited to this application?

.....

..... [2]

(iii) Electric cable is made by extruding a plastic coat on to copper wire.

(a) Name **two** plastics which are used for this purpose.

.....

..... [2]

(b) Use sketches and notes to show how extruding plastic coat onto copper wire is carried out.

[4]

[60]

13 Technology

Write your answer in the spaces provided.

(a) Fig. 16 shows a circuit designed for a water pollution indicator for rivers and canals. The input device is a light sensor and the output device is a bulb.

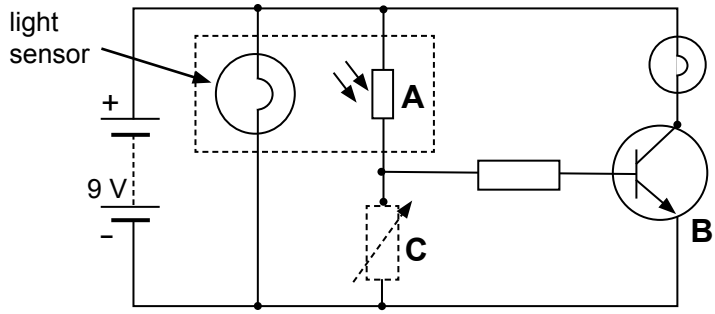

Fig. 16

(i) Name the components **A**, **B** and **C** in Fig. 16.

A.....

B.....

C..... [3]

(ii) State the function of component **C.**

.....

..... [1]

(iii) Briefly explain the operation of the circuit.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) A central heating boiler requires a control circuit to allow it to function safely.

The following should be kept in mind:

- There must be a room thermostat, to switch on the heat when cold.
- It must be possible to override the boiler if the room is warm.
- The gas to the boiler must not be turned on if the pilot light is out.

Fig. 17 shows a block diagram of the control circuit.

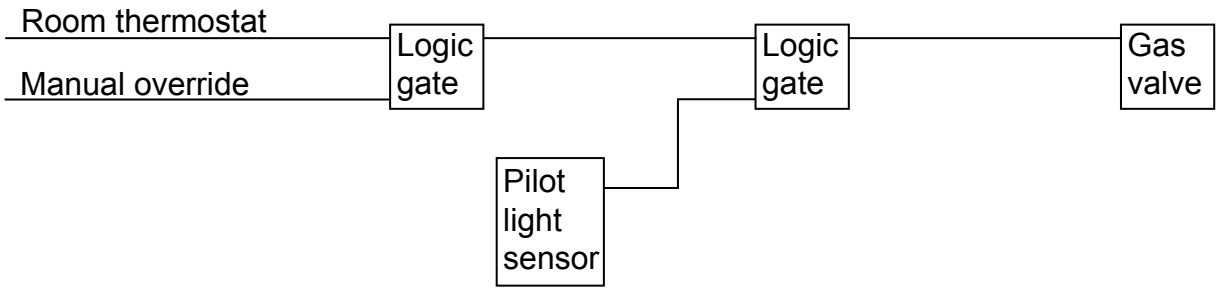

Fig. 17

(i) Draw a neat logic diagram for the control circuit

[4]

(ii) Briefly explain the logic diagram.

.....

..... [2]

(c) Fig. 18 shows a stepped cone pulley system used on some pillar drills. By changing the position of the V belt, three different shaft speeds can be obtained.

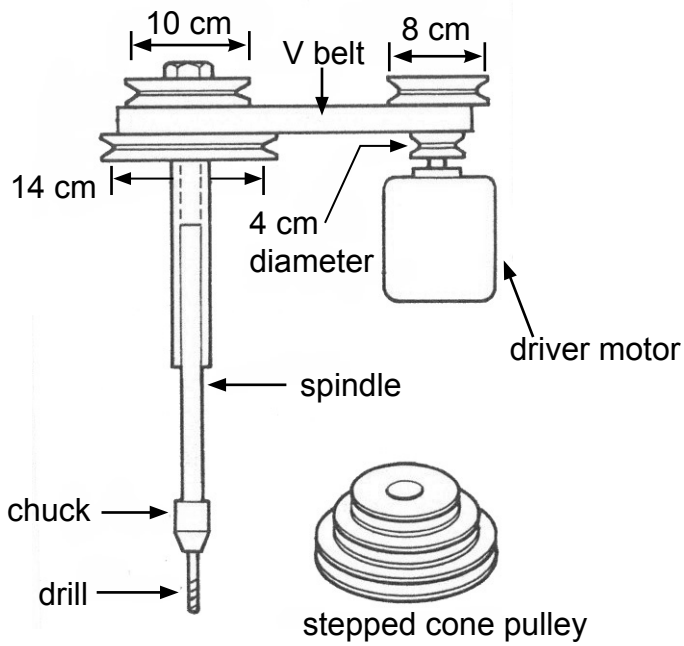

Fig. 18

(i) In which position must the belt be engaged to provied the highest drill speed?

..... [1]

(ii) If the driver motor runs at 1400 rpm, what is the highest drill speed?

[4]

(iii) What is the slowest speed at which the drill will run?

[3]

(d) A good structure must be able to withstand all forces it will experience without collapsing.

Name and describe the five different kinds of force which can act on and within a structure.

A.....

..... [2]

B.....

..... [2]

C .....

..... [2]

D .....

..... [2]

E.....

..... [2]

(e) (i) Briefly explain what is understood by the "centre of gravity".

.....

.....

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.....

.....

..... [3]

(ii) Fig. 19 shows a crane with a maximum load of 500 N.

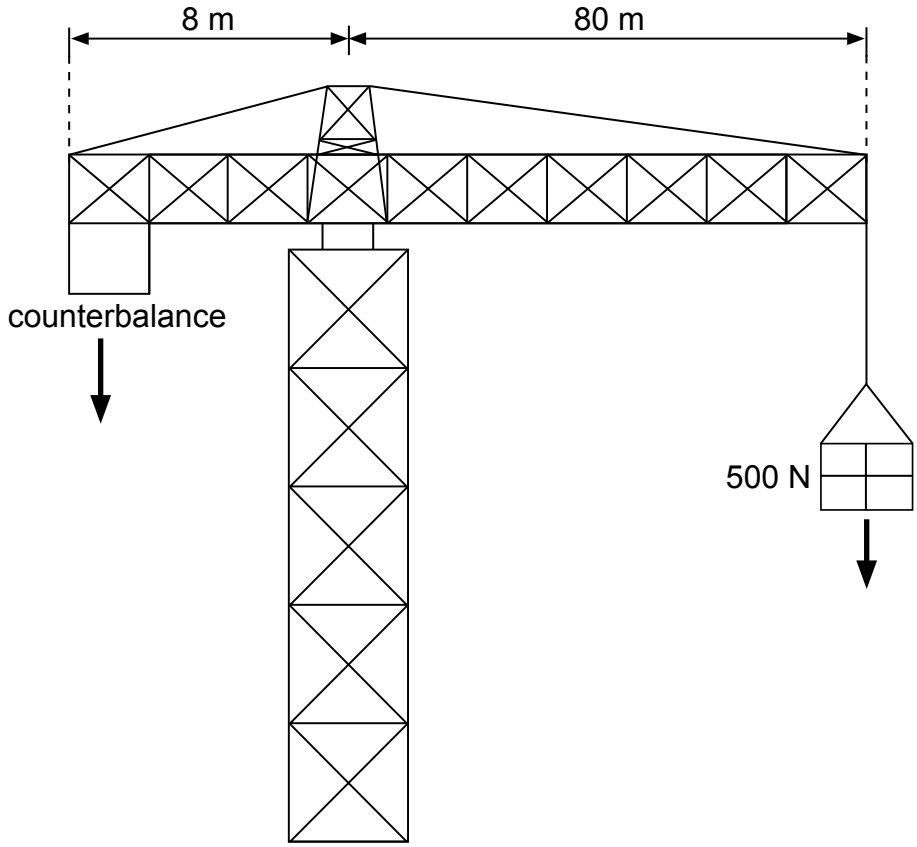

Fig. 19

(1) If the crane was used to lift the maximum load (as shown), what must be the weight of the counter balance for maximum stability?

[5]

(2) If the position of the load was moved along the jip, the crane would become unstable and could topple over. Explain this and show how this could be prevented.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

(f) There are three different classes of lever each with the effort, load and fulcrum arranged in different ways. Demonstrate by means of diagrams the three different classes of lever.

Class 1

[3]

Class 2

[3]

Class 3

[3]

(g) (i) List **three** sources of capital energy.

.....

.....

..... [3]

(ii) Briefly explain how mechanical energy is measured.

.....

.....

.....

..... [2]

[60]