Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

PHYSICS ORDINARY LEVEL

6118/2

PAPER 2

1 hour 30 minutes

Marks 80

2022

Additional Materials: Non-programmable calculator
Ruler

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Candidates answer on the Question Paper in the spaces provided.
- Write your Centre Number, Candidate Number and Name in the spaces provided on top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any diagrams, graphs or rough working.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.
- Answer **all** questions.
- The number of marks is given in brackets [ ] at the end of each question or part question.
- You will lose marks if you do not show your working or if you do not use appropriate units.
- Take the weight of 1 kg to be 10 N (i.e acceleration of free fall g = 10 m/s^2).

For Examiner's Use	
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This document consists of **15** printed pages and **1** blank page.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

For Examiner's Use

1 Give **one** word/term for each of the following scientific descriptions.
Write only the word/term next to the description.

(a) The energy of position. ..... [1]

(b) The basic principle on which electric generators function.

..... [1]

(c) The number of complete waves that pass a point in one second.

..... [1]

(d) The rate of doing work. ..... [1]

(e) The rate of change of velocity. ..... [1]

(f) Turning effect of force. ..... [1]

[6]

For Examiner's Use

2 Fig. 2.1 shows a fork-lift truck lifting a box.

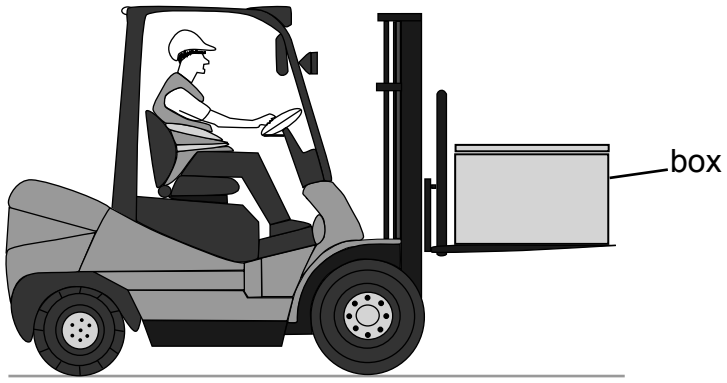


Fig. 2.1

The electric motor that drives the lifting mechanism is powered by batteries.

(a) State the form of the energy stored in the batteries.

..... [1]

(b) A box of mass 32 kg is lifted through a vertical distance of 2.5 m.

(i) Calculate the gravitational potential energy gained by the box.

gravitational potential energy = ...J [2]

(ii) The efficiency of the lifting mechanism is 65%.

Calculate the total energy input.

total energy input = ...J [2]

(c) The batteries are recharged from a mains voltage supply that is generated in an oil-fired power station.

By comparison with a wind farm, state **one** advantage and **one** disadvantage of running a power station using oil.

Advantage

..... [1]

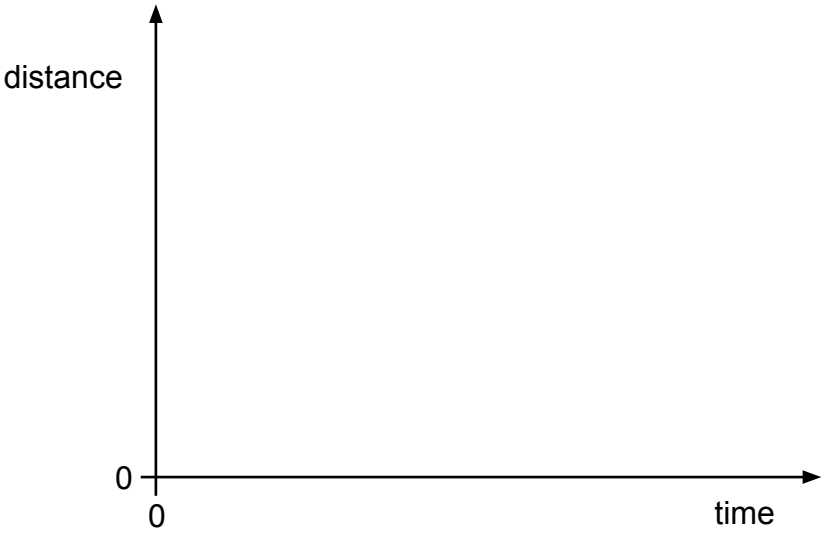
Disadvantage

..... [1]

[7]

3 (a) A bus travels at a constant speed. It stops for a short time and then travels at a higher constant speed.

Using the axes in Fig. 3.1, draw a distance-time graph of the journey.



[3]

Fig 3.1

(b) Fig. 3.2 shows the speed-time graph for an elevator as it starts moving from rest at the ground floor to the top floor of the building.

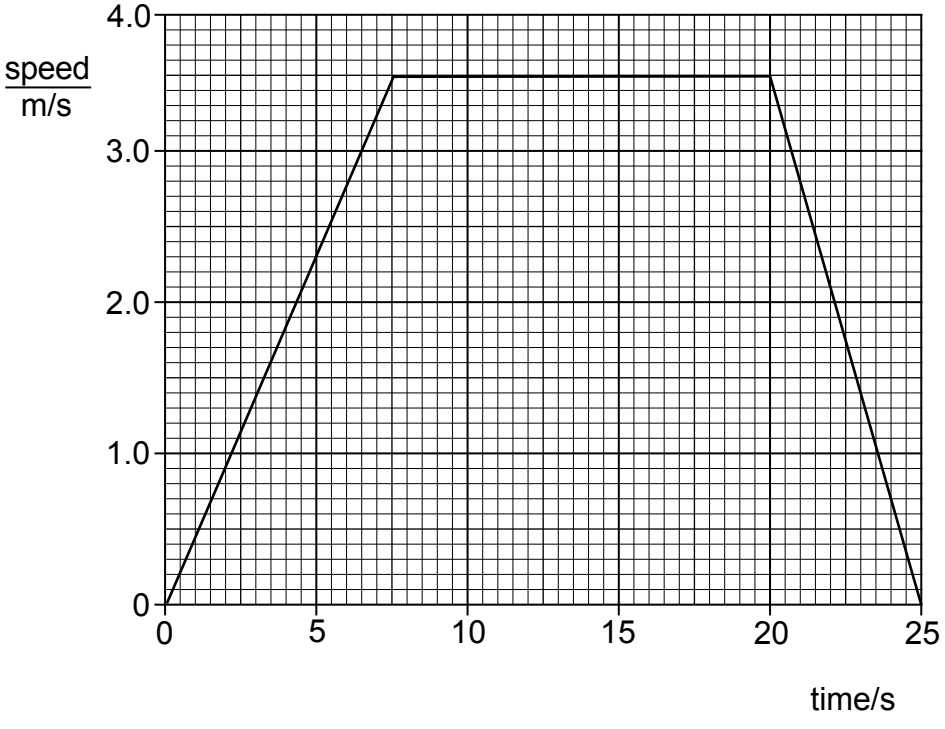


Fig 3.2

Use the graph in Fig. 3.2 to determine the distance from the ground floor to the top floor of the building.

Distance = ... m [3]

(c) (i) Using Fig 3.2, describe the motion of the elevator from 7.5 s to 20 s.

.....

..... [1]

(ii) Calculate the deceleration of the elevator from 20 s until it stopped at the top floor.

deceleration = ... m/s^2 [2]

[9]

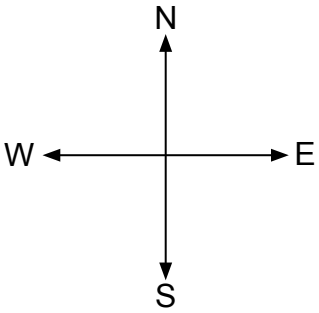
For Examiner's Use

4 **(a)** Define a *vector* quantity.

..... [1]

(b) An airplane is flying towards the east in still air at 92 m/s. The wind starts to blow at 24 m/s from the north.

Draw a vector diagram to find the resultant velocity of the airplane. Use a scale of 1.0 cm = 10 m/s.



resultant velocity = ...m/s

direction ..... [5]

[6]

For Examiner's Use

5 Fig. 5.1 shows a vehicle safety test. A car of mass 1000 kg moving at 20 m/s makes a head-on collision with a lorry of mass 2000 kg moving at a speed of 16 m/s.

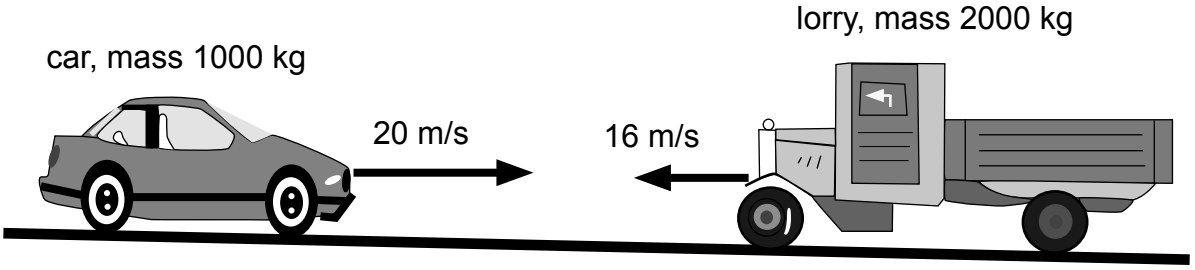


Fig. 5.1

(a) Define the principle of *conservation of momentum*.

.....

.....

..... [2]

(b) Calculate the total momentum of the two vehicles before collision.

momentum = ...kg.m/s [2]

(c) The two vehicles bounce back after collision. The car is now travelling at a speed of 15 m/s.

Using the principle of conservation of momentum, calculate the speed of the lorry after collision.

speed = ...m/s [2]

[6]

6 Fig. 6.1 shows part of the path of a ray of light through a glass block.

The critical angle for the glass/air boundary is 42°.

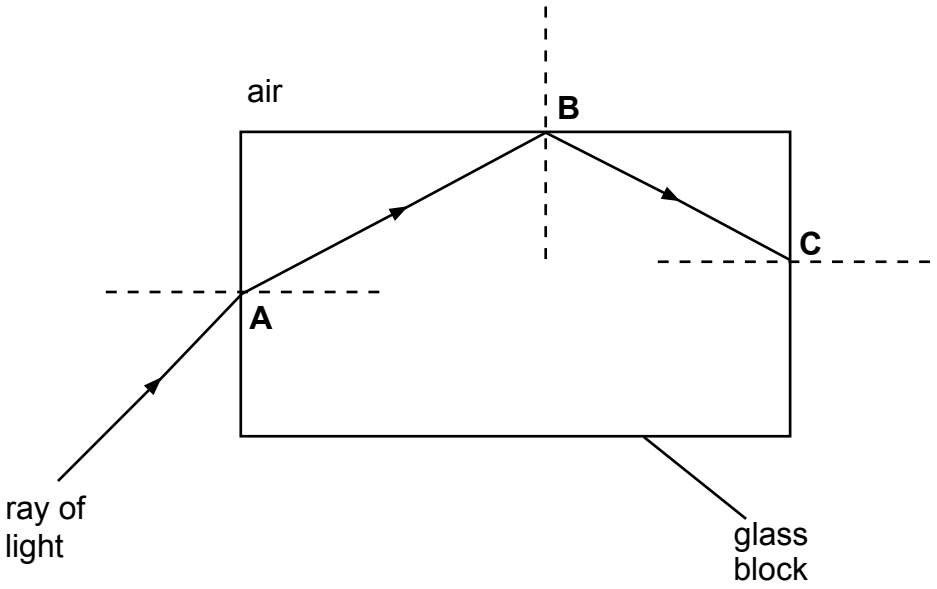


Fig. 6.1

(a) State the name that describes what is happening to the ray

at **A**, ...

at **B**. ..... [2]

(b) On Fig. 6.1, draw the path of the ray after **C**. [2]

[4]

For Examiner's Use

7 **(a)** Fig. 7.1 shows an object **O** placed in front of a converging lens.

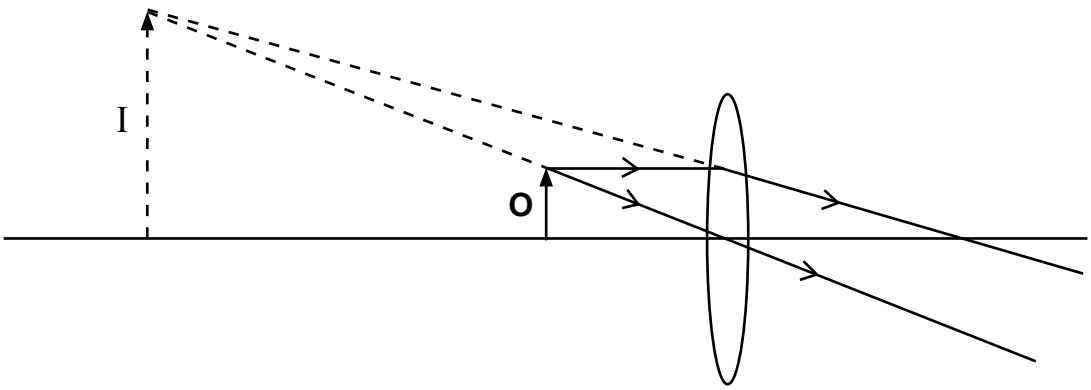


Fig. 7.1

(i) State a full description of image I.

.....

..... [2]

(ii) Using the ruler measure the focal length of the lens.

focal length = ...cm [1]

(b) Fig 7.2, shows an object **O** placed to the left of a converging lens.
A principal focus of the lens is at the position marked F.

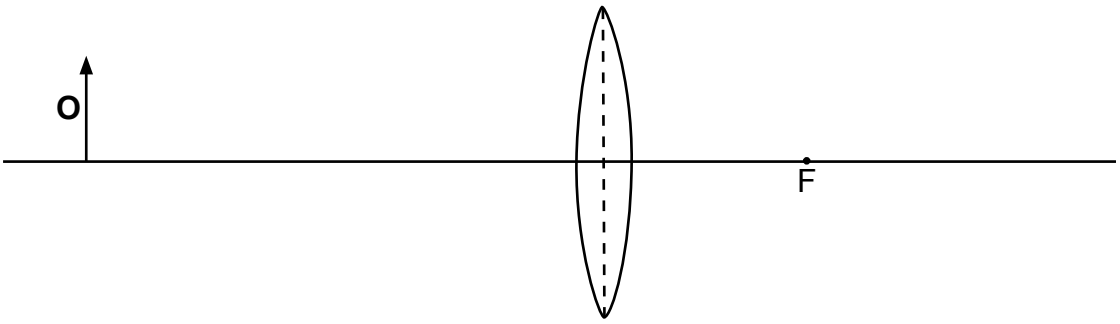


Fig. 7.2

(i) On Fig. 7.2, draw two rays to locate the image of object **O**.
Draw the image. [3]

(ii) Give **two** properties of the image formed.

.....

..... [2]

[8]

8 A boat is using echo-sounding equipment to measure the depth of the water underneath it, as illustrated in Fig. 8.1.

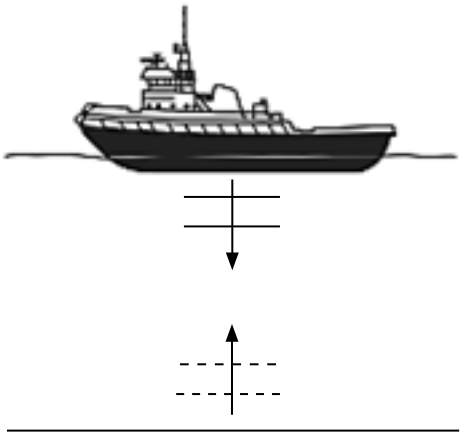


Fig. 8.1

The equipment in the boat sends a short pulse of sound downwards and detects the echo after a time.

(a) Define the term *pulse*.

..... [1]

(b) The wave is displayed on the cathode ray oscilloscope, and the wavelength is 2 m.

Calculate the speed of sound, if the period of the wave is 0.0013 s.

speed.....m/s [3]

[4]

For Examiner's Use

9 Fig. 9.1 shows how one type of electric storage heater is constructed.

The heater has ceramic bricks inside. The electric elements heat the ceramic bricks during the night. Later, during the daytime, the ceramic bricks transfer the stored energy to the room.

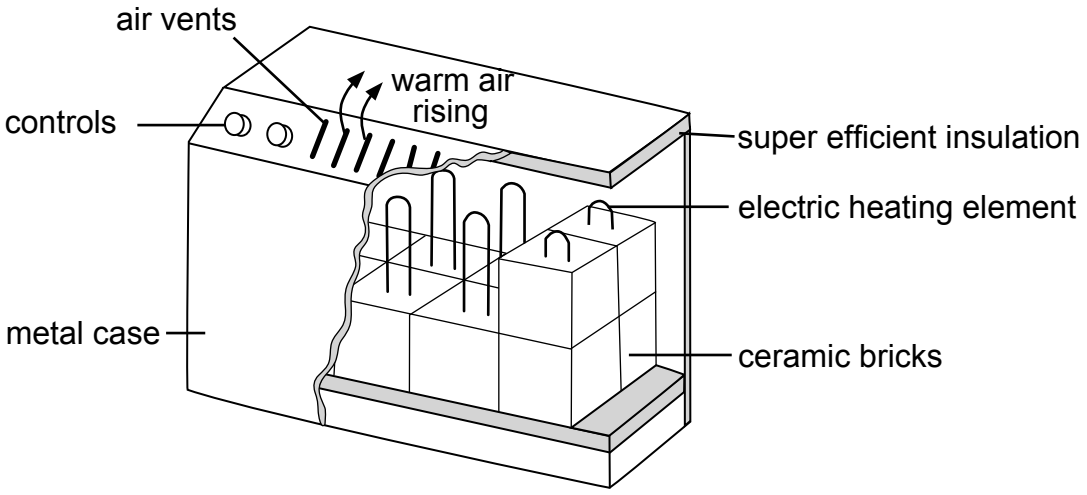


Fig. 9.1

(a) (i) Complete the following sentences using the words from the box.

conduction	**convection**	**evaporation**

Energy is transferred through the metal casing by ..... [1]

The warm air rising from the heater transfers energy to the room by

..... [1]

(ii) Give a reason why the inside of the metal case is insulated.

..... [1]

(b) In winter, the electricity supply to a 2.6 kW storage heater is switched on for seven hours each day.

(i) Calculate the energy transferred, in kilowatt-hours, from the electricity supply to the heater in 7 hours.

energy..... kWh [2]

(ii) Calculate the cost of electricity if the heater is switched on for 7 hours at the rate of N$5.00 per kilowatt-hour.

cost = N$ ..... [1]

(c) After the electricity supply is switched off, the temperature of the ceramic bricks falls by 25°C.

(i) Define the term *specific heat capacity*.

.....

.....

..... [2]

(ii) Calculate the energy transferred from the ceramic bricks after the electric supply is switched off. Include the unit.

Total mass of ceramic bricks = 120 kg.

Specific heat capacity of the ceramic bricks = 750 J/kg °C.

energy = ...Unit ..... [3]

[11]

For Examiner's Use

10 Fig. 10.1 shows two electrical circuits each containing one lamp of resistance 3 Ω and one lamp of resistance 5 Ω.

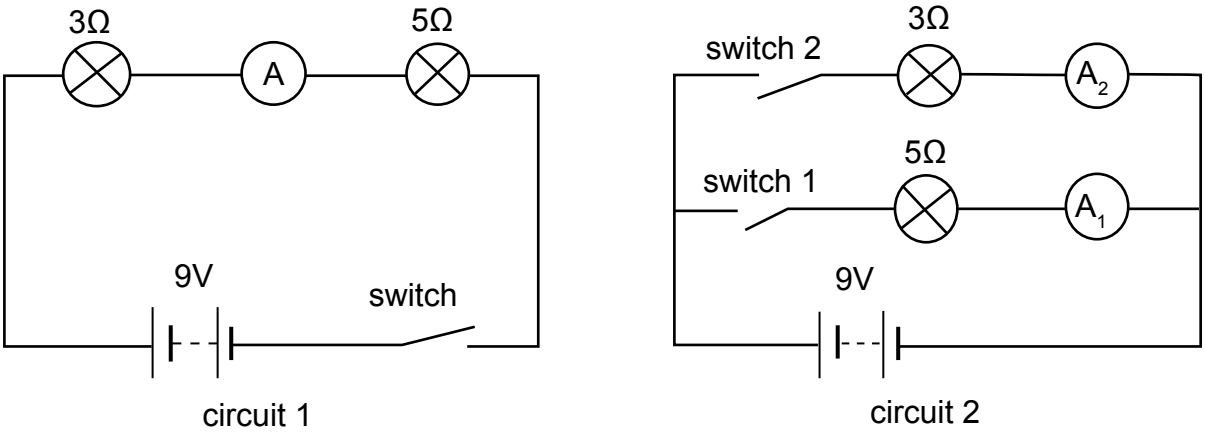


Fig. 10.1

(a) (i) Name the arrangement of the lamps shown in circuit 2.

..... [1]

(ii) State **two** advantages of connecting the lamps as shown in circuit 2.

.....

.....

..... [2]

(b) Calculate the ammeter reading shown in circuit 1, when the switch is closed.

..... A [3]

(c) Calculate the combined resistance of the lamps in circuit 2, when both switches are closed.

combined resistance = ... Ω [2]

[8]

11 The diagram on Fig. 11.1 shows an a.c. generator.

The coil rotates about the axis as shown and cuts through the magnetic field produced by the magnets.

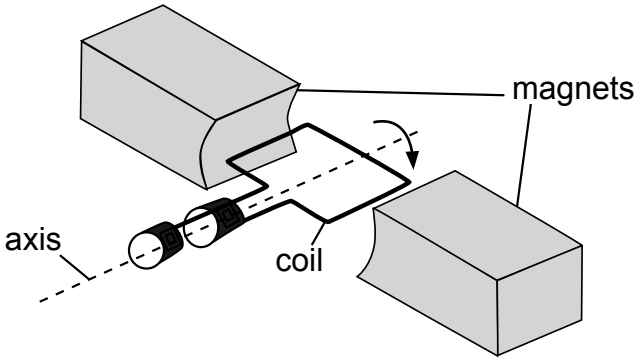


Fig. 11.1

Fig. 11.2 shows the graph of the output from the a.c. generator

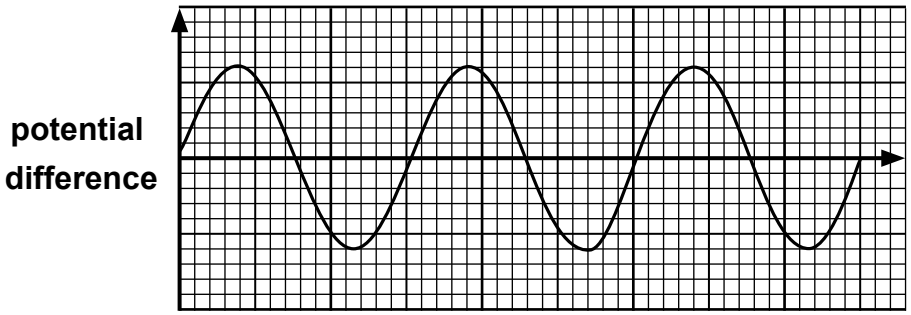


Fig. 11.2

(a) The vertical axis on Fig. 11.2 is labelled potential difference.

What is the label of the horizontal axis?

..... [1]

(b) The coil is rotated faster.

On Fig. 11.2, draw the output from the a.c. generator if everything else remains the same. [2]

(c) The number of turns of wire on the coil is increased. This increases the maximum induced potential difference.

State **two** other ways in which the maximum induced potential difference could be increased.

1 .....

.....

2 .....

..... [2]

[5]

12 The count rate from a sample of radioactive material is measured for every 20 minutes for 2 hours.

The results, suitably corrected for background radiation, are shown in Table 12.1.

Table 12.1

time/min	0	20	40	60	80	100	120
count rate / counts/s	280	210	164	122	88	72	54

(a) Describe **one** major cause of the background radiation.

..... [1]

(b) The radioactive material emits a beta particle.

Describe the nature of a beta particle.

.....

..... [2]

(c) From the Table 12.1, without attempting a graph, estimate the half-life of the radioactive material.

half-life = ...min [1]

(d) State **two** precautions that should be taken for safe handling of the radioactive material.

.....

.....

.....

.....

..... [2]

[6]

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