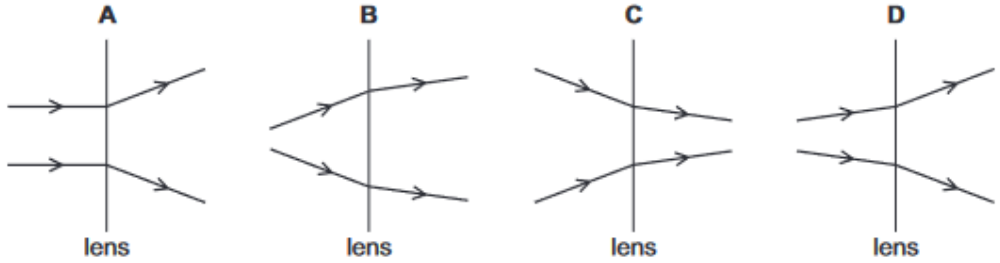
25 Which diagram shows rays of light passing through a converging lens?



23 A plane mirror forms the image of an object.

What are characteristics of the image formed?

	size	type
A	same as object	real
B	same as object	virtual
C	smaller than object	real
D	smaller than object	virtual

24 A ray of light strikes the surface of a glass block at an angle of incidence of 45°.

The refractive index of the glass is 1.8.

What is the angle of refraction inside the block?

A 23° **B** 25° **C** 45° **D** 81°

17 The air in each of four syringes is slowly compressed so that the temperature of the air stays constant. The volumes before and after compression for each syringe are given in the table.

The air in all four syringes is initially at the same pressure.

Which syringe shows the smallest pressure change?

	volume before compression / cm^3	volume after compression / cm^3
A	50	10
B	100	50
C	400	25
D	400	100

18 The temperature of a substance is measured with a liquid-in-glass thermometer.

Which physical property changes so that the temperature can be measured?

A length of the thermometer

B mass of the liquid

C specific heat capacity of the liquid

D volume of the liquid

19 Boiling and evaporation are different processes.

Which statement is correct?

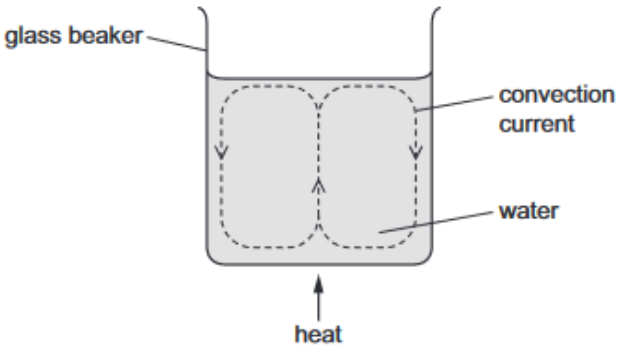
A Boiling only occurs at the surface of a liquid.

B Evaporation only occurs when the temperature of the liquid is high enough.

C Evaporation does not change the temperature of a liquid.

D When a boiling liquid is heated its temperature remains constant.

20 A glass beaker contains water. When the centre of the base of the beaker is heated, a convection current is set up.



Which statement explains this?

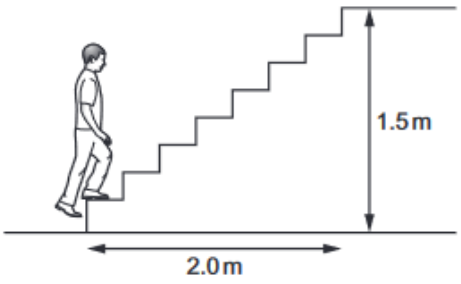
A The evaporation of water causes water molecules to rise to the surface.

B The expansion of water molecules causes them to rise to the surface.

C The water above the heat source rises because it becomes less dense.

D The water at the side falls because it becomes less dense.

11 A student of mass 60 kg climbs some steps. He travels a horizontal distance of 2.0 m and a vertical distance of 1.5 m.



NOT TO SCALE

What is the work done against the force of gravity?

A 88 J **B** 118 J **C** 880 J **D** 1200 J

12 Which method of producing electricity does **not** involve a turbine?

A hydroelectric power station

B nuclear power station

C solar cells

D wind generator

13 The input power to a lamp is 6.0 W. The lamp wastes 2.7 J of energy in 3.0 s.

What is the efficiency of the lamp?

A 0.15 **B** 0.45 **C** 0.55 **D** 0.85

14 A camera is taken under water and left at a depth of 8.0 m.

atmospheric pressure = 100 000 Pa

density of water = 1000 kg / m^3

What is the total pressure acting on the camera?

A 22 000 Pa **B** 78 000 Pa **C** 110 000 Pa **D** 178 000 Pa

7 An unstretched spring of length 15.0 cm stretches by 4.0 cm when a mass of weight 6.0 N is suspended from it. The spring does not exceed the limit of proportionality.

What is the total length of the spring when the weight of the suspended mass is 3.0 N?

A 2.0 cm **B** 7.5 cm **C** 9.5 cm **D** 17.0 cm

8 Which statements describing the moment of a force about a pivot are correct?

1 The moment of a force is a measure of the turning effect of the force.

2 The moment of a force is equal to the force × perpendicular distance from the pivot.

3 The moment of a force is equal to the force × pressure on the pivot.

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

3 The table shows the distance travelled by a car in each 2 s time interval during a 12 s period of its journey.

time interval / s	0–2	2–4	4–6	6–8	8–10	10–12
distance travelled in time interval / m	10	10	11	13	16	23

Which statement describes the motion of the car?

A moving with constant speed from 0–4 s, followed by non-uniform acceleration

B moving with constant speed from 0–4 s, then uniform acceleration

C at rest from 0–4 s, then non-uniform acceleration

D at rest from 0–4 s, then uniform acceleration

4 Two cubes, X and Y, have the same mass, but the length of a side of X is twice that of Y.

What is the value of the ratio $\frac{\text{density of X}}{\text{density of Y}}$?

A 0.125 **B** 1.0 **C** 4.0 **D** 8.0

7 A car travels along a road. The force on the car due to the engine is 800 N.

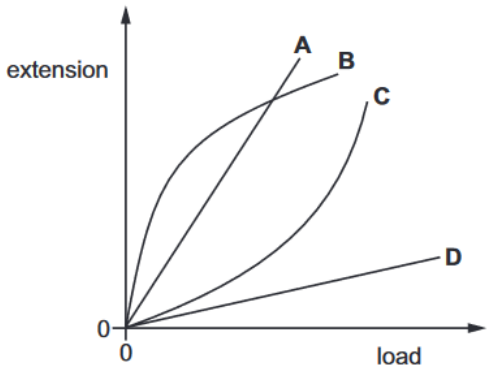
The motion of the car depends on the value of the total resistive force R.

Which row shows the motion of the car for the given value of R?

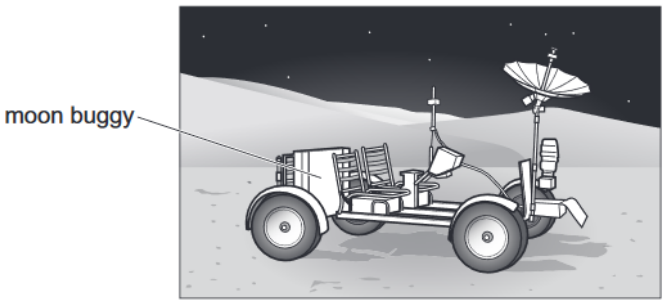
	value of resistive force R / N	motion
A	500	deceleration
B	800	acceleration
C	900	deceleration
D	1000	acceleration

10 The graph shows how the extension of four different threads depends on the load attached.

Which thread is the most difficult to stretch over the range of loads shown?



6 The diagram shows a moon buggy used by astronauts.



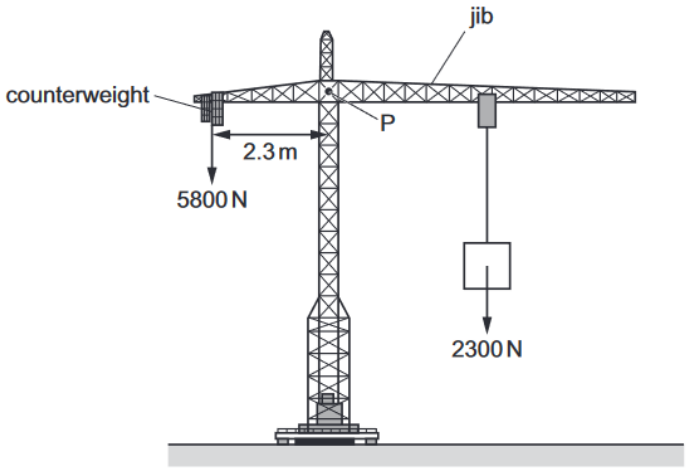
The mass of the moon buggy on the Earth is 210 kg. The gravitational field strength on the Moon is $\frac{1}{6}$ of that on the Earth.

What is the weight of the moon buggy on the Moon?

A zero **B** 35 N **C** 210 N **D** 340 N

12 A crane has a 5800 N counterweight positioned 2.3 m from the tower along a horizontal jib.

The centre of gravity P of the crane jib is marked.



What is the horizontal distance between the 2300 N load and P so that there is no moment about P?

A 0.91 m **B** 3.5 m **C** 5.8 m **D** 8.1 m

13 A car of mass 750 kg travels 400 m at 25 m / s. It then accelerates to 35 m / s and travels a further 400 m.

What is the change in the momentum of the car due to acceleration?

A 7500 kg m / s

B 24 000 kg m / s

C 45 000 kg m / s

D 75 000 kg m / s

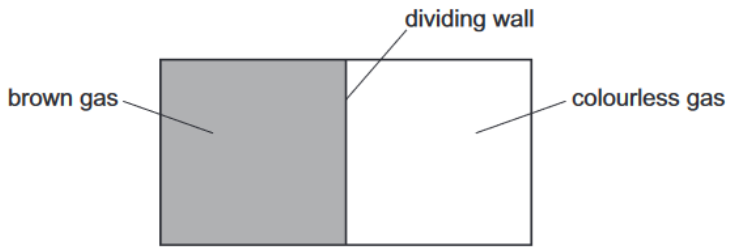
14 A ball is dropped from rest at the top of a building. Air resistance is negligible.

The velocity of the ball is 14 m / s when it hits the ground.

What is the height of the building?

A 2.9 m **B** 10 m **C** 20 m **D** 40 m

19 A transparent box has a dividing wall in its middle. It contains two different gases, one in each half, as shown.



The dividing wall is removed. The box is left for a long time. The gases do not react.

What is then seen in the box?

A brown gas on the right and colourless gas on the left

B pale brown gas throughout

C several distinct clouds of colourless and brown gas throughout

D colourless gas on the right and brown gas on the left

21 What is the specific heat capacity of a liquid?

A the difference between the boiling temperature and the melting temperature of the liquid

B the energy required to change the state of 1 kg of the liquid

C the energy required to heat 1 kg of the liquid through 1 °C

D the increase in temperature of the liquid when it is heated

22 Which statement about infrared radiation is correct?

A In a vacuum, infrared radiation travels at the speed of light.

B Infrared radiation is a longitudinal wave.

C Infrared radiation has a higher frequency than ultraviolet radiation.

D White surfaces are better emitters of infrared radiation than black surfaces.

15 Which energy source is available constantly over a 24-hour period?

A natural gas

B solar cells

C tidal

D wind

16 A 15 W lamp is turned on for 30 minutes. It wastes 7000 J of energy.

What is the efficiency of the lamp?

A 0.26 **B** 0.35 **C** 0.59 **D** 0.74

17 Which quantity is **not** measured in joules (J)?

A gravitational potential energy

B latent heat

C power

D work

18 Which description of a liquid is correct?

A fixed shape, fixed volume

B fixed shape, variable volume

C variable shape, fixed volume

D variable shape, variable volume

23 The speed of sound in air is 330 m / s.

Which sound is classed as ultrasound?

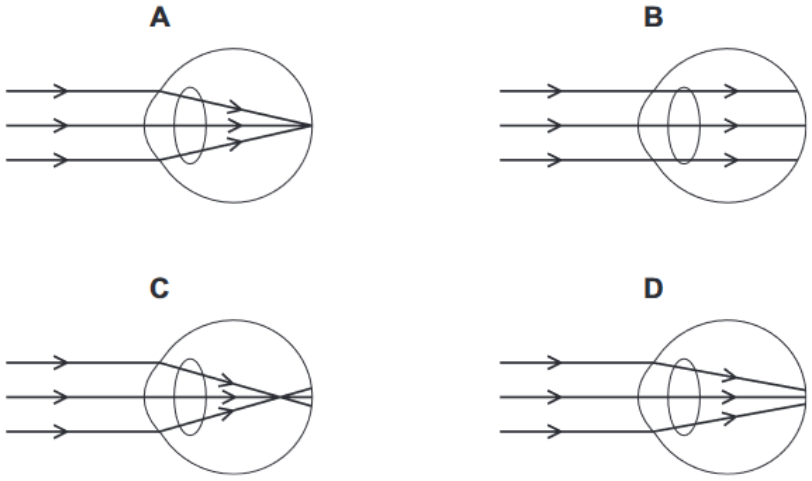
A a sound with a wavelength of 250 cm

B a sound with a wavelength of 25 cm

C a sound with a wavelength of 2.5 cm

D none of the above

24 Which diagram shows how light from a distant object forms an image in a normal eye?



25 The colour of visible light is related to the wavelength of the light.

Which list of colours is in order of increasing wavelength?

A blue → green → yellow → red

B blue → green → red → yellow

C green → red → yellow → blue

D red → yellow → green → blue

27 Which application is **not** a use for ultrasound?

A cleaning jewellery

B scanning an unborn baby

C sonar

D sterilising water

28 Which equation is correct for potential difference (p.d.)?

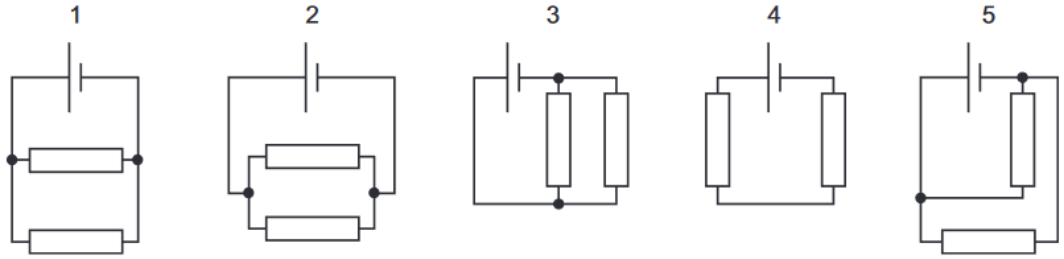
A p.d. = voltage × current

B $\text{p.d.} = \frac{\text{energy}}{\text{time}}$

C $\text{p.d.} = \frac{\text{work done}}{\text{charge}}$

D $\text{p.d.} = \frac{\text{current}}{\text{resistance}}$

29 The diagrams show five electrical circuits. All of the resistors shown are identical.



Which circuits have equal resistance?

A 1, 2, 3 and 5

B 1, 2, 4 and 5

C 1, 3, 4 and 5

D 2, 3, 4 and 5

31 How many kilowatt-hours of energy are used by a 1000 W heater connected to a 230 V supply for 30 minutes?

A 0.30 kW h **B** 0.50 kW h **C** 30 kW h **D** 120 kW h

32 Which safety precautions must be taken when wiring an electrical kettle that has a stainless-steel outer casing?

A It must be earthed and have a fuse in the live wire.

B It must be earthed and have a fuse in the neutral wire.

C It needs a fuse in the live wire but does **not** need to be earthed.

D It needs a fuse in the neutral wire but does **not** need to be earthed.