1.8 Pressure

01. 0625_w13_qp_62 Q: 5

The IGCSE class is investigating pressure.

A student places a rectangular block on a sheet of paper on the bench and draws the outline.

Fig. 5.1 shows the outline.

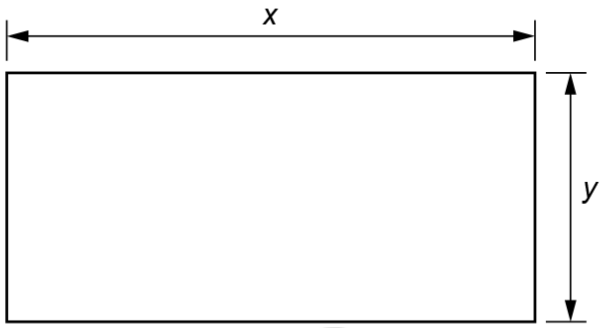

Fig. 5.1

(a) **(i)** On Fig. 5.1, measure the length *x* of the block.

x = ...[1]

(ii) On Fig. 5.1, measure the width *y* of the block.

y = ...[1]

(b) Fig. 5.2 shows the block being weighed using a forcemeter.

(i) Using Fig. 5.2, write down the weight *W* of the block.

W = ...[1]

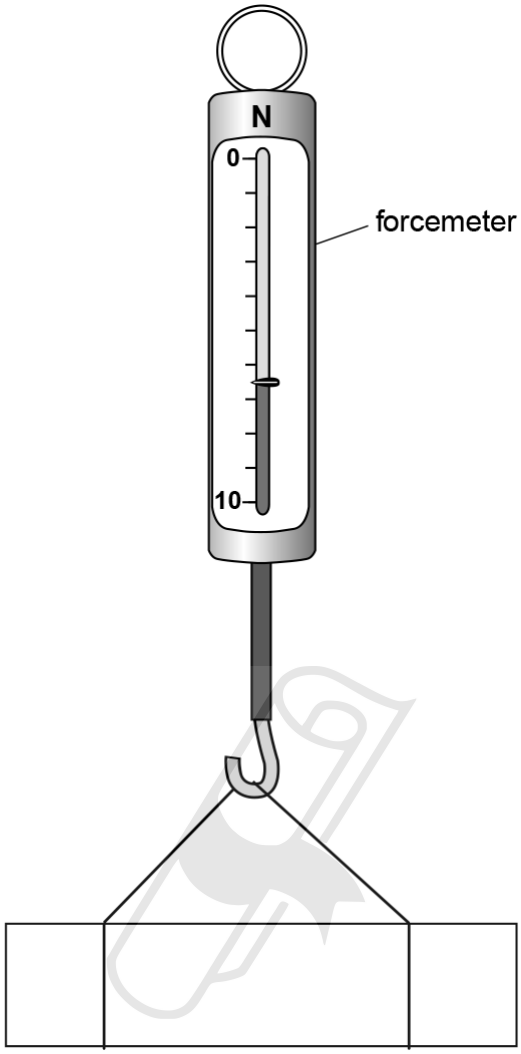

Fig. 5.2

(ii) Calculate the pressure P that the block exerts on the bench. Use the equation $P = \frac{W}{A}$ where A is the area of the block in contact with the bench ($A = xy$).

P = ...
[1]

(c) The value calculated for P is slightly too small.

Suggest one practical source of inaccuracy that would account for this.

.....

.....[1]

[Total: 5]

02. 0625_s12_qp_62 Q: 5

The IGCSE class is determining the refractive index of the material of a transparent block.

Fig. 5.1 shows a student's ray-trace sheet.

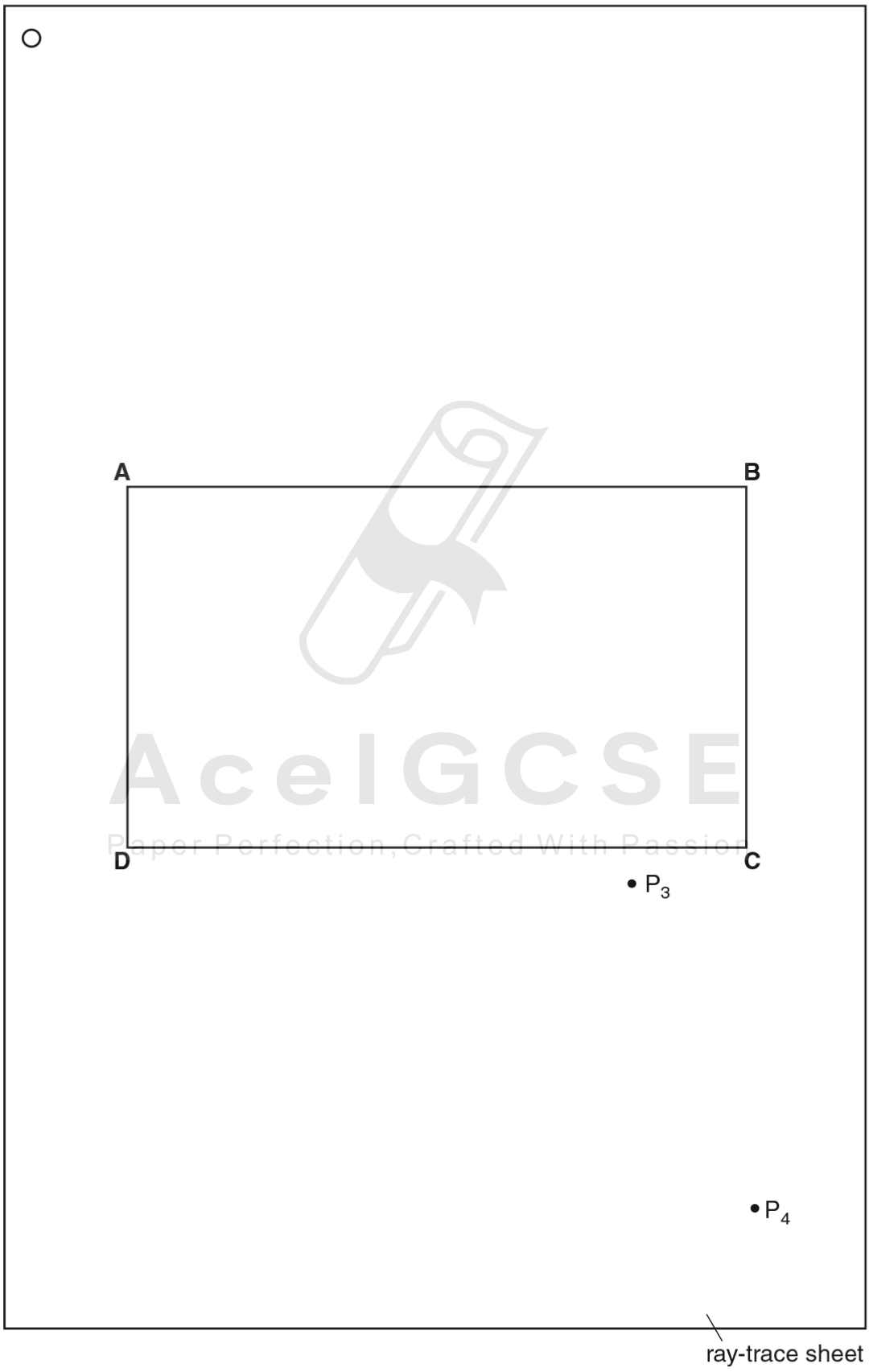

Fig. 5.1

(a) **ABCD** is a transparent block placed, largest face down, on the ray-trace sheet.

(i) On Fig. 5.1, draw a normal at the centre of side **AB**. Label the point **E** where the normal crosses **AB**. Mark a point **N** on the normal 4.0 cm from **E** and outside the outline of the block. [1]

(ii) Draw a line **NF** from **N** to the block. This line must be to the right of the normal and at an angle of 20° to the normal. Mark the point **F** where the line meets **AB**. Measure and record the length *a* of the line **NF**.

a = ... [2]

(b) The student places two pins P_1 and P_2 on the line through **F** and **N**. She observes the images of P_1 and P_2 through side **CD** of the block so that the images of P_1 and P_2 appear one behind the other.

She places two pins P_3 and P_4 between her eye and the block so that P_3 and P_4 and the images of P_1 and P_2, seen through the block, appear one behind the other. The positions of P_3 and P_4 are marked on Fig. 5.1.

(i) Draw a line joining the positions of P_3 and P_4. Continue the line until it meets **CD**. Label this point **G**.

(ii) Draw the line **GF** and continue it until it meets the normal. Label this point **H**.

(iii) Measure and record the length *b* of the line **FH**.

b = ...
[3]

(iv) Calculate the refractive index *n* of the material of the block, using the equation $n = \frac{b}{a}$.

n = ...[2]

(c) Suggest one precaution that you would take in this experiment to obtain readings that are as accurate as possible.

.....

.....[1]

[Total: 9]

03. 0625_w12_qp_61 Q: 5

(a) The IGCSE class has a range of apparatus available. Here is a list of some of the apparatus.

ammeter

barometer

beaker

electronic balance

manometer

measuring cylinder

metre rule

newtonmeter (spring balance)

stopwatch

tape measure

thermometer

voltmeter

Complete Table 5.1 by inserting the name of one piece of apparatus from the list that is the most suitable for measuring each quantity described.

Table 5.1

quantity to be measured	most suitable apparatus
volume of water	
a distance of about 50 m	
the force required to lift a laboratory stool	
the mass of a coin	
the pressure of the laboratory gas supply	

[5]

(b) The IGCSE class is carrying out a lens experiment. This involves using an illuminated object, a screen and a lens.

Firstly, the distance between the illuminated object and the lens is measured with a metre rule. Next, a clearly focused image is obtained on the screen.

(i) Explain briefly how you would avoid a parallax (line-of-sight) error when using the metre rule.

.....

.....

.....[1]

(ii) State a precaution that you would take to ensure that the image is well focused.

.....

.....

.....[1]

[Total: 7]

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(a) (i) x = 7.0 cm / 70 mm unit needed, accept 6.95 to 7.0 cm [1]

(ii) y = 3.3 cm / 33 mm unit needed, c.a.o., accept 3.30 cm [1]

(b) (i) 6.5(N) ignore unit [1]

(ii) 0.28 N / cm^2 (0.0028 N / mm^2, 2800 N/m^2 or Pa) e.c.f.
unit needed, ignore significant figures [1]

(c) any one from:
outline is larger than block / thickness of pencil line
zero error on forcemeter
precision with which the ruler can be read
precision of forcemeter / large gaps on scale
block not of uniform thickness/length [1]

[Total: 5]

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(a) Trace:
Normal at 90° in correct position [1]
N at 4 cm above AB and angle of incidence 20° [1]
a value 4.3 cm ± 1 mm correct answer only [1]

(b) All correct lines drawn, thin and continuous [1]
a and b both with consistent, correct unit which matches figures [1]
b value 6.2 cm ± 3 mm correct answer only [1]
n value range 1.4 – 1.5 after rounding [1]
to 2 or 3 significant figures and no unit [1]

(c) One from:
Pins well spaced
Pins at least 5 cm apart
View bases of pins
Ensure pins vertical
Use thin lines
Sharp pencil
Use thin pins [1]

[Total: 9]

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03. 0625_w12_MS_61 Q: 5

(a) Measuring cylinder
Tape measure
Newtonmeter (spring balance)
Electronic balance
Manometer

1 mark each [5]

(b) **(i)** Viewing scale perpendicularly (owtte) [1]

(ii) Any one from:
Moving lens back and forth
Dark area (owtte)
Object and lens at same height from bench
Object lens and screen at right angles to bench [1]

[Total: 7]