Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Secondary Education
January 2008

PHYSICS **PHY3F**
Unit Physics P3 **F**

Foundation Tier

Monday 21 January 2008 1.30 pm to 2.15 pm

For this paper you must have:
- a pencil and a ruler.

You may use a calculator.

Time allowed: 45 minutes

Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

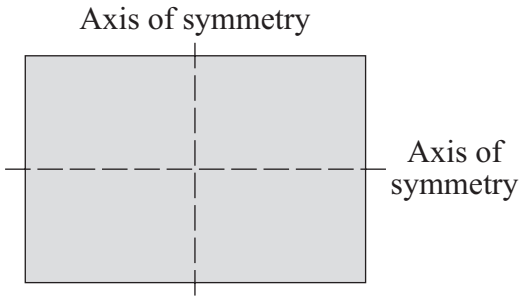
Information
- The maximum mark for this paper is 45.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice
- In all calculations, show clearly how you work out your answer.

For Examiner's Use			
Question	Mark	Question	Mark
1		8	
2		9	
3			
4			
5			
6			
7			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Answer **all** questions in the spaces provided.

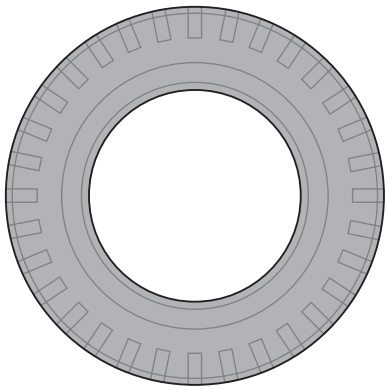
1 (a) The diagram shows a rectangle made out of a sheet of cardboard.



Draw an **X** on the diagram so that the centre of the **X** is at the centre of mass of the rectangle.

(1 mark)

(b) The drawing shows a car tyre.



(i) Where is the centre of mass of the tyre?

.....

(1 mark)

(ii) Explain your answer to (b)(i).

.....

.....

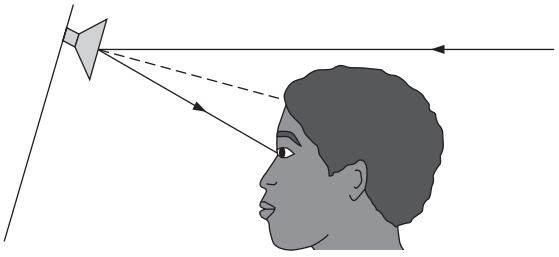
(1 mark)

3

2 (a) The diagram shows a motorist looking into her driving mirror.

(i) Mark on the diagram:

I to show the incident ray
r to show the angle of reflection.



(2 marks)

(ii) Name the dashed line shown in the diagram.

.....

(1 mark)

(b) List **A** gives the names of two types of mirror. List **B** shows how three types of mirror are represented in diagrams.

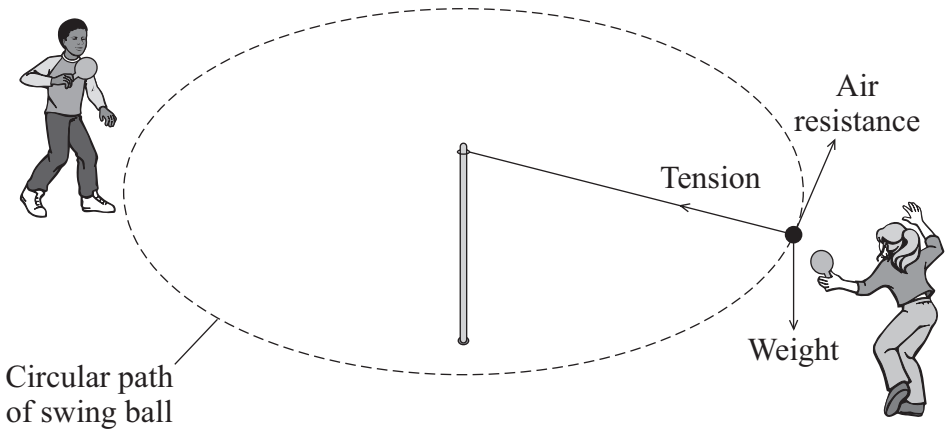
Draw a line from each type of mirror in list **A** to the correct mirror in list **B**.

List **A**	List **B**
Concave mirror	
Plane mirror	
	

(2 marks)

5

3 The diagram shows two children playing with a toy called a swing ball. The ball is joined to a pole by a strong string. The children hit the ball so that it goes round in a circular path.



(a) Which force causes the ball to move in a circle?

Draw a ring around your answer.

air resistance **tension** **weight**

(1 mark)

(b) Complete the sentences by ticking (✓) the correct ending.

(i) The force needed to make the ball move in a circular path is larger if

the speed of the ball is increased. ☐

the speed of the ball is decreased. ☐

the string is made longer. ☐

(1 mark)

(ii) The continuous acceleration of a ball moving in a circular path changes

the speed of the ball. ☐

the direction of the ball. ☐

the weight of the ball. ☐

(1 mark)

(c) Which of the following words is used to describe any force that causes an object to move in a circular path?

Draw a ring around your answer.

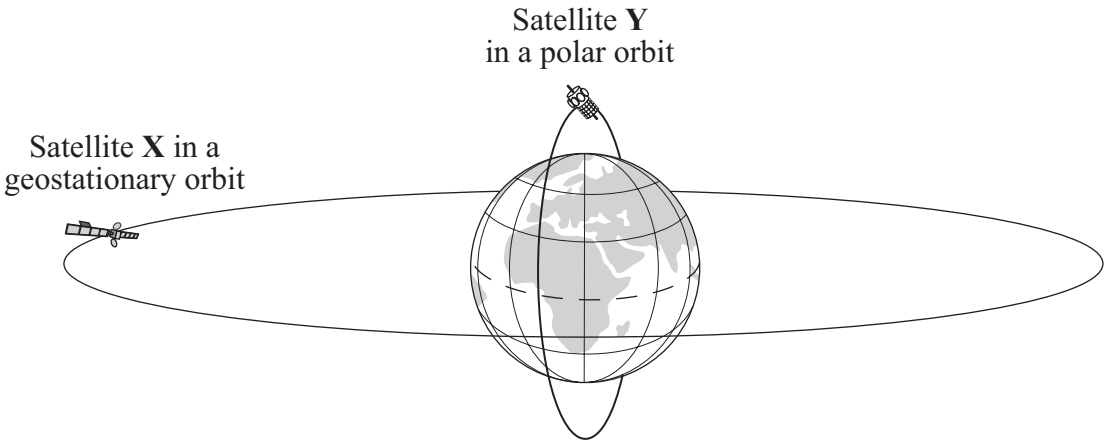
centripetal **frictional** **gravitational** **universal**

(1 mark)

4

Turn over for the next question

4 The diagram shows two satellites orbiting the Earth.



These satellites have the same mass.

(a) Complete the following sentences by drawing a ring around the correct words in each box.

(i) The time taken for one orbit by satellite **X** is

less than
the same as
more than

the time for one orbit by satellite **Y**.

(1 mark)

(ii) The force between the Earth and satellite **X** is

less than
the same as
more than

the force between the Earth and satellite **Y**.

(1 mark)

(b) A communication satellite is put into a geostationary orbit.

What is a geostationary orbit?

.....

.....

.....

.....

(2 marks)

(c) A company plans to launch a satellite to monitor the weather.

Which type of orbit is usually used for this purpose?

Draw a ring around your answer.

geostationary **high polar** **low polar**

(1 mark)

5

Turn over for the next question

5 Two students collect data from the Internet about planets in the Solar System.

The table shows the data that they collect about the first six planets.

Name of planet	Distance from the Sun in arbitrary units	Time for one orbit of the Sun in years	Mean surface temperature of the planet in ºC
Mercury	0.4	0.2	+ 125
Venus	0.7	0.6	+ 465
Earth	1.0	1.0	+ 22
Mars	1.5	1.9	– 48
Jupiter	5.2	11.9	
Saturn	9.6	29.5	– 180

(a) One student says that the mean surface temperature of planets gets less the further they are from the Sun. The other student agrees but says that one planet does not fit the pattern.

Which planet does not fit the pattern?

.....

(1 mark)

(b) Estimate a value for the mean surface temperature of Jupiter.

Mean surface temperature of Jupiter = ... ºC

(1 mark)

(c) Use words from the box to complete the following conclusion reached using the data in the table.

You can use the words once, more than once or not at all.

decreases	**increases**	**stays the same**

As the distance from the Sun to a planet.....

the time taken for the planet to orbit the Sun..... .

(1 mark)

LEAVE MARGIN BLANK

(d) Hundreds of years ago, some scientists thought that Mars was a hot planet because it has a reddish colour.

Which **one** of the following statements gives the reason why scientists no longer think this?

Put a tick (✓) in the box next to your answer.

Hundreds of years ago, scientists got everything wrong. ☐

Today's scientists have new evidence about Mars. ☐

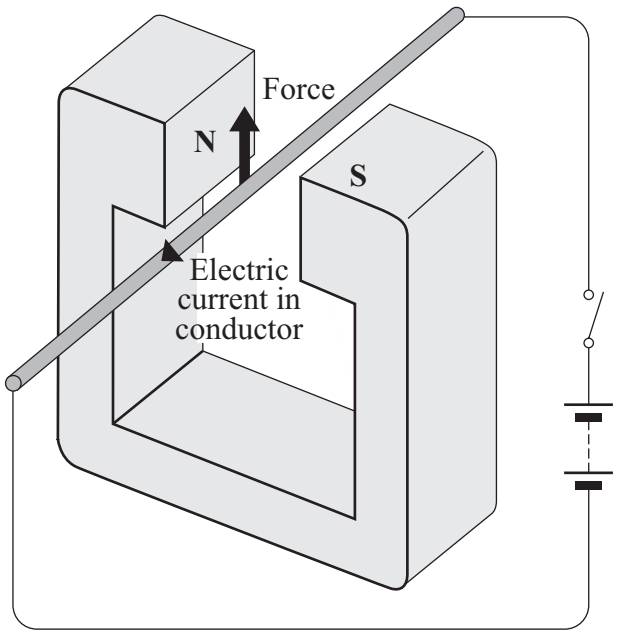
All scientific ideas change every one hundred years. ☐

(1 mark)

4

Turn over for the next question

6 When a conductor carrying an electric current is placed in a magnetic field a force may act on it.



(a) State **two** ways in which this force can be increased.

1 .....

2 .....

(2 marks)

(b) State **two** ways in which this force can be made to act in the opposite direction.

1 .....

2 .....

(2 marks)

(c) In what circumstance will **no** force act on a conductor carrying an electric current and in a magnetic field?

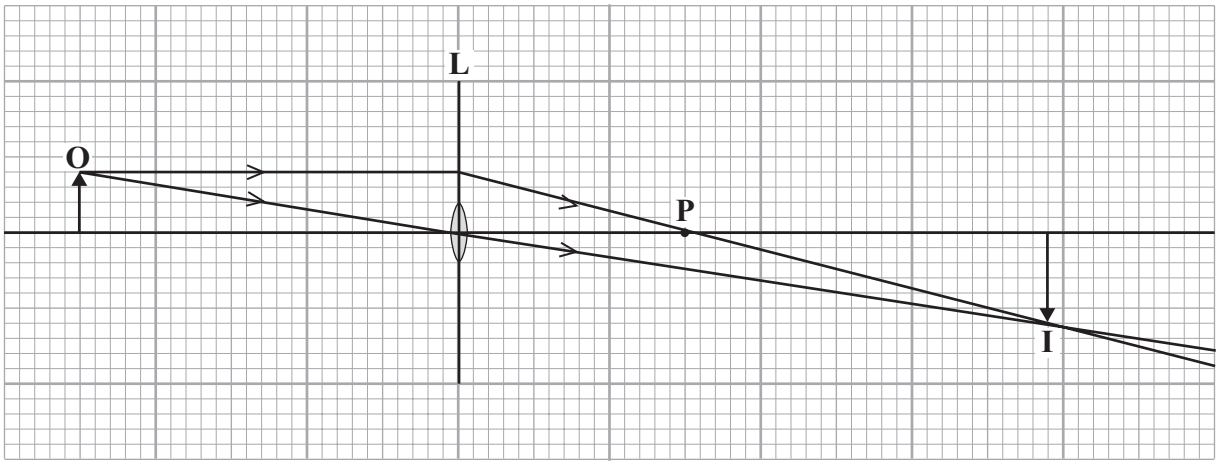
.....

.....

(1 mark)

5

7 The ray diagram shows the position and size of the image, **I**, of an object, **O**, formed by a lens, **L**.



(a) What type of lens is shown in the ray diagram?

.....

(1 mark)

(b) Name the point labelled **P**.

.....

(1 mark)

(c) The ray diagram has been drawn to scale.

Use the equation in the box to calculate the magnification.

$$\text{magnification} = \frac{\text{image height}}{\text{object height}}$$

Show clearly how you work out your answer.

.....

.....

Magnification = ...

(2 marks)

(d) How can you tell from this ray diagram that the image is a real image?

.....

.....

(1 mark)

5

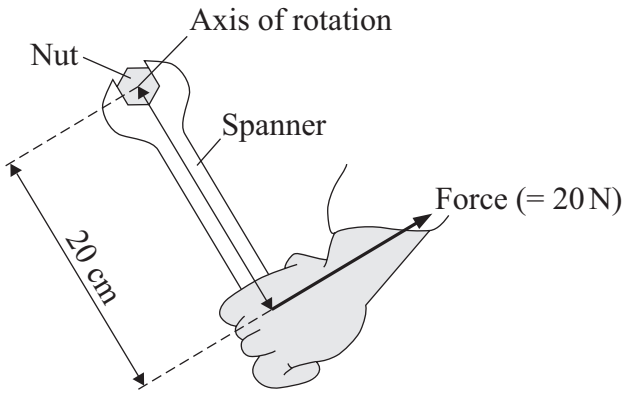
Turn over ▶

8 A spanner gives a turning effect to undo a nut.

(a) Complete the sentence.

The turning effect of a force is called the ..... of the force.
(1 mark)

(b) The diagram shows a spanner being used.



Use the equation in the box to calculate the spanner's turning effect in newton metres.

turning effect = force × perpendicular distance from the line of action of the force to the axis of rotation

Show clearly how you work out your answer.

.....

.....

Turning effect = ... Nm
(2 marks)

(c) Give **two** ways in which you can increase the spanner's turning effect.

1 .....

2 .....
(2 marks)

5

9 When sound waves reach a material, some of the energy of the sound is reflected and some is transmitted through the material.

(a) Complete the sentence.

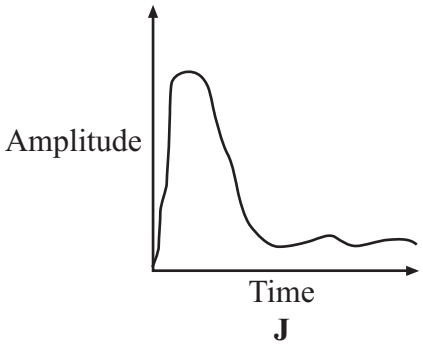
Sound waves are caused by ..... .

(1 mark)

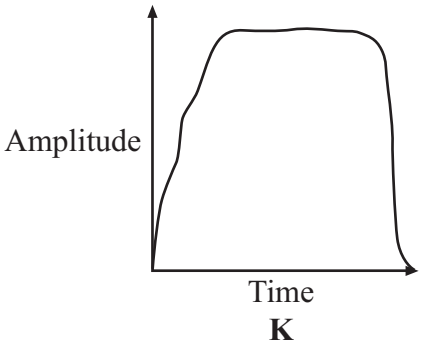
(b) The graphs **J**, **K**, **L** and **M** represent the sound energy reflected from a surface.

The graphs are all drawn to the same scale.

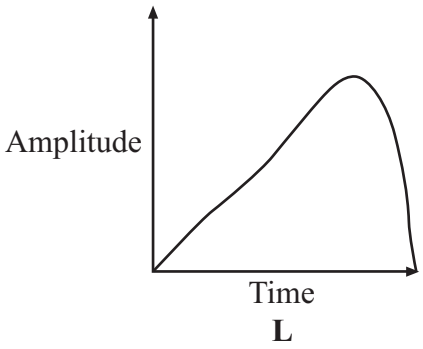
Which graph shows the greatest total sound energy output from the surface?



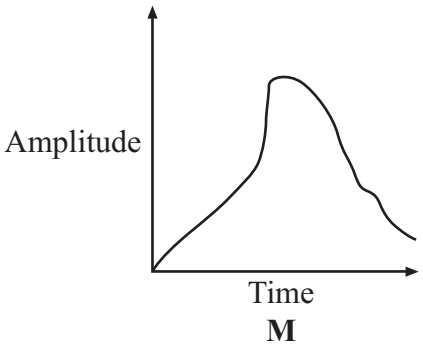
J



K



L



M

Graph .....

(1 mark)

Question 9 continues on the next page

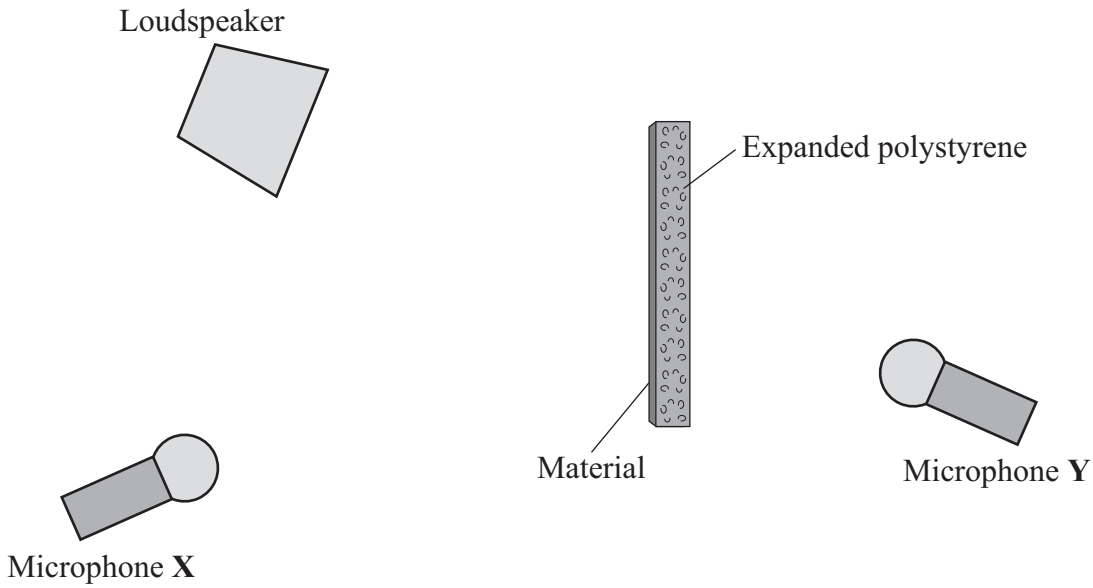
Turn over ▶

(c) The proportion of the sound energy which is reflected or transmitted depends on the material which receives the sound.

A student investigates different materials.

The diagram shows how a student sets up her equipment.

(i) Using a pencil and ruler to draw on the diagram, show how microphone **X** receives reflected sound.



(2 marks)

(ii) The student tests four materials. Each sheet of material is 1 mm thick. This has been glued onto a block of expanded polystyrene.

Why does the student use the same size of expanded polystyrene block and the same sound level for each test?

.....

.....

(1 mark)

(iii) The table shows the readings for the sound level transmitted to microphone **Y**.

Sound level from loudspeaker in arbitrary units	**Surface material**	**Sound level transmitted to microphone Y in arbitrary units**
60	paper	39
60	plaster	18
60	cloth	31
60	wood	15

[A] Which surface material transmits the smallest proportion of the sound?

.....

(1 mark)

[B] What proportion is this?

.....

(1 mark)

(d) People living in a flat have very noisy neighbours who are always playing loud music.

Suggest **one** practical idea to reduce the amount of noise transmitted into the flat through the walls and explain how your idea will work.

.....

.....

.....

.....

.....

.....

(2 marks)

9

END OF QUESTIONS

There are no questions printed on this page