Title

O-Leve Topical Physics

(PAPER-2)
THEORY

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PREFACE

IN THE NAME OF ALLAH, MOST GRACIOUS AND MOST MERCIFUL.

Excellence is not an art. It is the habit of practice. In this regard the concepts learnt can only be assessed when questions are answered. The perfect logical approach to this is to take one step at a time.

Chapter wise learning and its application on exam-based questions provides exclusive comprehension. This booklet is the perfect resource for the practice of complete Physics O'Level syllabus. This compilation has been refined by experts who have tried to make this book error free.

The book has been edited and checked to remove possible mistakes. However, constructive criticism is welcome. You may call us for your productive feedback and suggestions at this No. (0332-6682372) . This book is recommended by all renowned Physics teachers who contributed to make it effective and fruitful.

This book provides:

- Knowledge with understanding.
- Handling information and solving problems or Experimental skills and investigation.
- Sorted/separated questions or parts of questions, placed in related classified topics.
- Questions in order from the early years to most recent years.
- Answering Key/ Mark Scheme at the end of each topic.
- Actual spacing between consecutive questions and within options as per CAIE format which gives students a genuine feel of attempting questions. In addition to all this; review, feedback and contribution in this booklet by various experienced teachers of the subject belonging to popular school chains makes it a treasured resource for both the teachers and the students.

Team Coordinator

in case of any suggestion for improvement Team Head can be contacted at

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Quality Policy

- Customer satisfaction is our priority and achieve this goal we will always, work as a team.
- Produce and supply finest quality goods meeting all the specification including Environmental concern and safety
- Every employee will influence to contribute towards
- Quality improvement to sustain through ideas and innovation.

- گاہک کا اطمینان ہماری اولین ترجیح ہے۔
- اپنے مقصد کے حصول کیلئے ہم ہمیشہ بحیثیت ایک ٹیم کام کرتے ہیں۔
- گاہک کی ضروریات اور ماحولیاتی حالات اور احتیاطی تدابیر کہ مدنظر رکھتے ہوئے معیاری اشیاء فراہم کرتے ہیں۔
- ہر فرد اپنے خیالات اور تخلیقات کے ذریعے بہتر کوالٹی اور اس کو برقرار رکھنے کیلئے موثر کردار ادا کرتا ہے۔

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1 Motion, forces and energy

1.1 Physical quantities and measurement techniques

1 Describe how to measure a variety of lengths with appropriate precision using tapes, rulers and micrometers (including reading the scale on an analogue micrometer)

2 Describe how to use a measuring cylinder to measure the volume of a liquid and to determine the volume of a solid by displacement

3 Describe how to measure a variety of time intervals using clocks and digital timers

4 Determine an average value for a small distance and for a short interval of time by measuring multiples (including the period of oscillation of a pendulum)

5 Understand that a scalar quantity has magnitude (size) only and that a vector quantity has magnitude and direction

6 Know that the following quantities are scalars: distance, speed, time, mass, energy and temperature

7 Know that the following quantities are vectors: displacement, force, weight, velocity, acceleration, momentum, electric field strength and gravitational field strength

8 Determine, by calculation or graphically, the resultant of two vectors at right angles

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Q2/21/O/N/20

1 Fig. 2.1 shows a satellite moving at a constant speed in a circular orbit around the Earth.

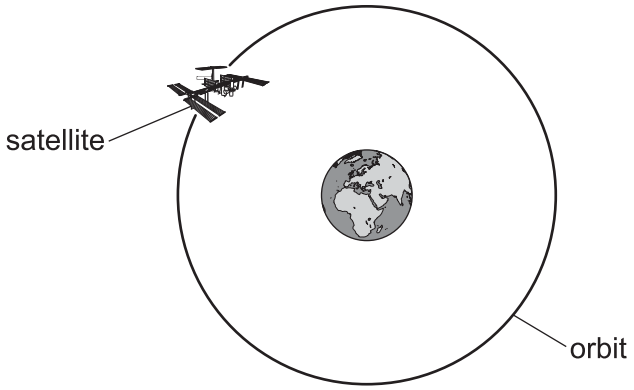

Fig. 2.1 (not to scale)

Speed is a scalar quantity but velocity is a vector quantity.

(a) State how a scalar quantity differs from a vector quantity.

.....

..... [1]

(b) Underline every vector quantity in the list.

distance **displacement** **force** **length** **mass** **time**

[1]

(c) There is a resultant force acting on the satellite in Fig. 2.1.

(i) Explain how the motion of the satellite shows that a resultant force is acting on it.

.....

.....

..... [2]

(ii) State the cause of this force.

.....

..... [1]

RABBANI BROTHERS & SON's

Q1(a)/21/M/J/21

2 An aircraft flies at a constant height.

Air drag and the force from the aircraft's engines together produce a force on the aircraft of 36 kN due north, as shown in Fig. 1.1.

The wind produces a force of 12 kN towards the east.

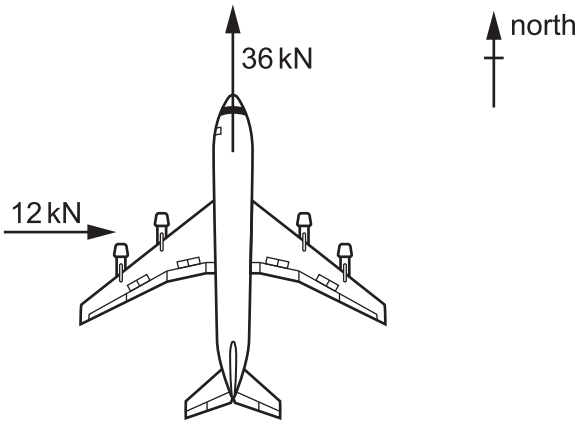

Fig. 1.1 (not to scale)

(a) Draw a scale drawing to show the resultant force acting on the aircraft.

Use your drawing to determine the size of the resultant force and the angle between the resultant force and north.

size of resultant force = ...

angle = ...

[3]

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Q1/22/M/J/21

3 (a) (i) State the difference between a scalar quantity and a vector quantity.

.....

.....

..... [1]

(ii) State **two** examples of each type of quantity.

scalar quantity	**vector quantity**
1	1 .....
2	2 .....

[2]

(b) Fig. 1.1 shows the direction and size of two vectors P and Q.

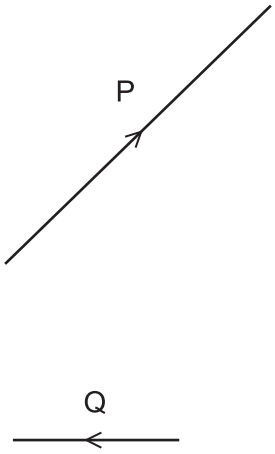

Fig. 1.1

In the space next to Fig. 1.1, draw a labelled vector diagram to show the resultant vector obtained by adding vector P to vector Q.

Draw vector P, vector Q and the resultant vector to the same scale as in Fig. 1.1.

[2]

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Q9(b,c)/21/O/N/23

4 The planet Venus orbits the Sun at a constant speed of 3.5×10^4 m/s and takes a time T_V to complete one orbit.

(b) Explain why speed is a scalar quantity.

.....

..... [1]

(c) Velocity is a vector quantity.

(i) Explain what happens to the velocity of Venus as it orbits the Sun.

.....

.....

.....

..... [2]

(ii) There is a resultant force on Venus as it orbits the Sun. The force is perpendicular to the direction of the motion of Venus.

State why this force is needed.

.....

..... [1]

RABBANI BROTHERS & SON's

Q1/22/O/N/23

5 Velocity is a vector quantity but speed is a scalar quantity.

(a) State how a vector quantity differs from a scalar quantity.

.....

..... [1]

(b) Underline **all** the vector quantities in the list.

acceleration distance energy mass momentum temperature [1]

(c) Fig. 1.1 shows a passenger running across a large ship at right angles to the direction in which the ship is moving.

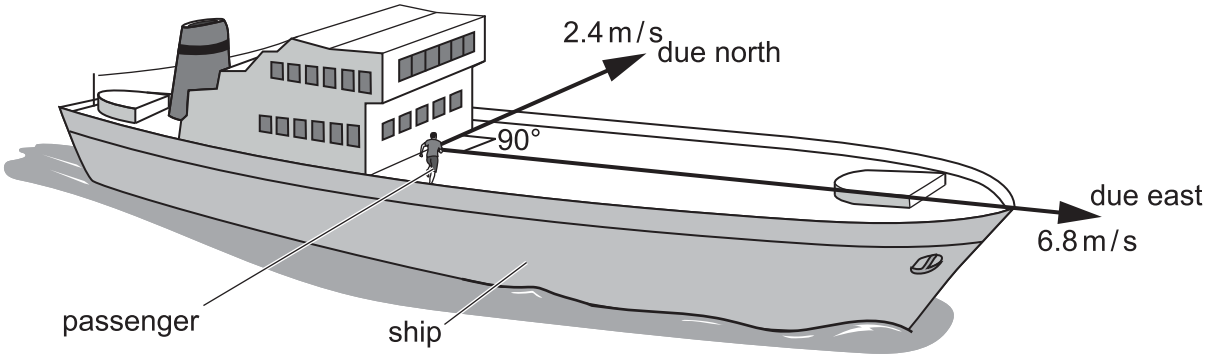

Fig. 1.1 (not to scale)

The passenger runs across the ship at 2.4 m/s due north.
The large ship is travelling due east at 6.8 m/s.
Determine, either graphically or by calculation, the resultant velocity of the passenger. Give the direction in which the passenger is moving relative to due north.
Show how the answer is obtained.

velocity = ... m/s at ..... ° from due north [4]

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Q1(d)/21/M/J/25

6 Fig. 1.1 shows a skydiver falling vertically through the air.

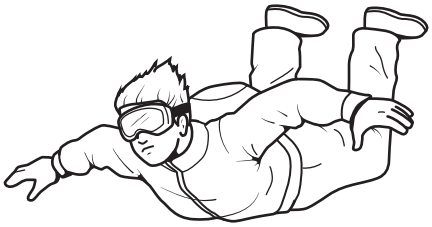

Fig. 1.1

In the first part of the fall, her speed increases and her acceleration decreases.

In the second part of the fall, her speed is constant.

(d) At one instant, the vertical force on the skydiver is 400 N downwards.

At the same instant, the wind causes an additional horizontal force of 100 N to the right to act on the skydiver.

Draw a vector diagram to determine the resultant of the 400 N vertical force and the 100 N horizontal force. Place an arrow on all of the forces to show their directions.

Determine the magnitude (size) of this resultant force and its direction to the vertical.

magnitude of resultant = ... N

direction = ...° to vertical
[3]

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