education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 11

TECHNICAL SCIENCES P1

JUNE 2024

MARKS: 150

TIME: 3 hours

This question paper consists of 15 pages, 1 data sheet.

INSTRUCTIONS AND INFORMATION

1.   This question paper consists of TEN (10) questions. Answer ALL questions in the ANSWER BOOK.

2.   Start EACH section on a NEW page in the ANSWER BOOK.

3.   Number the answers correctly according to the numbering system used in this question paper.

4.   Leave ONE line between each subquestions, e.g. between QUESTION 2.1 and QUESTION 2.2.

5.   You may use a non-programmable calculator.

6.   You may use appropriate mathematical instruments.

7.   You are advised to use the attached DATA SHEET.

8.   Show ALL formulae and substitutions in ALL calculations.

9.   Round off your FINAL numerical answers to a minimum of TWO decimal places.

10. Give brief motivations, discussions, etc. where required.

11. Write neatly and legibly.

SECTION A

QUESTION 1: MULTIPLE CHOICE QUESTIONS

Various options are being provided as possible answers to the following questions. Each question has ONE correct answer. Write only the letter (A–D) next to the question numbers (1.1 to 1.10) in the answer book, e.g.1.11 A.

1.1   The SI unit for force is …

    A   newton.

    B   centimeter.

    C   kilogram.

    D   joules.

    (2)
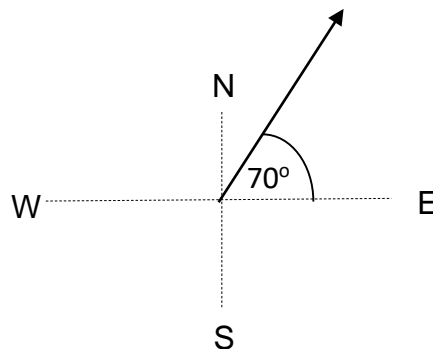
1.2   The longest side of a right angled triangle is called the …

    A   horizontal side.

    B   hypotenuse.

    C   adjacent side.

    D   right angle side.

    (2)

1.3   Using the bearing method, the direction of the vector in the diagram below is …

    A   North East.

    B   at a bearing of 20º.

    C   at a bearing of 120º.

    D   70º North of east.

    (2)

1.4   Kinetic frictional force is a type of frictional force which acts when an object is …

         A   rolling.

         B   stationary.

         C   falling.

         D   sliding.   (2)

1.5   Which ONE of the following statements is NOT correct about frictional force?

         Frictional force is …

         A   dependent on the normal force.

         B   always opposing the motion or attempted motion of one surface across another.

         C   a non-contact force.

         D   a contact force.   (2)

1.6   Which of the following is a ferromagnetic material?

         A   Iron

         B   Carbon

         C   Aluminum

         D   Copper   (2)

1.7   Stream of ionized gas that blow outwards from the sun towards the earth at a speed of 400 km/h.

         A   Solar winds

         B   Aurora borealis
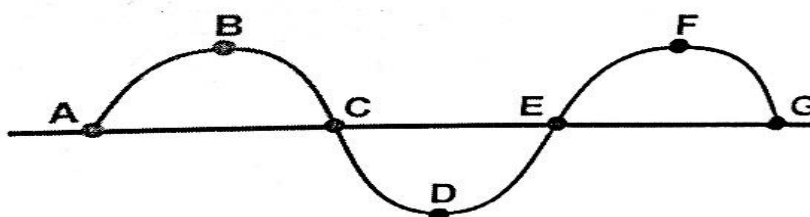
         C   Southern lights

         D   Bow Shock   (2)

1.8   The frequency of a wave is determined by the:

   A   Amplitude

   B   Medium through which the wave propagates

   C   Frequency of the source

   D   Wavelength   (2)

1.9   Sound waves are an example of:

   A   Longitudinal waves

   B   Surface waves

   C   Electromagnetic waves

   D   Transverse waves   (2)

1.10   Identify TWO points that are in phase in the diagram below

   A   [A&C]

   B   [C&E]

   C   [E&G]

   D   [B&F]   (2)
                                                                                       [20]

QUESTION 2 – MATCHING COLUMNS

Match COLUMN A with the corresponding answer in COLUMN B. Write only the letter of the corresponding correct answer next to the question number. e.g. 2.11 – B

COLUMN A		COLUMN B	
2.1	A relationship where both set of axis increase or decrease by the same factor	A	Co-planar vectors
2.2	A physical quantity with magnitude and direction	B	Static frictional force
2.3	Vectors which lie on the same plane	C	Equilibrant
2.4	A frictional force that acts between two surfaces when there is no motion between the surfaces	D	Trough
		E	Pulse
2.5	A force which is equal to the resultant but points in the opposite direction	F	Magnetic field
2.6	The lowest point on a transverse wave	G	Direct proportion
2.7	The number of waves to pass a fixed point per second	H	Transverse wave
		I	Vector
2.8	A space around a magnet where another magnet or a ferromagnetic material will experience a force	J	Frequency
		K	Co-linear vectors
2.9	A wave in which the particles vibrate perpendicular to the direction of propagation of the wave		
2.10	A single disturbance in a medium.		

(10 x 1) (10)

SECTION B

QUESTION 3

The information in the table below represents a relationship between Travel time and Speed. Study the table below and answer the questions that follow.
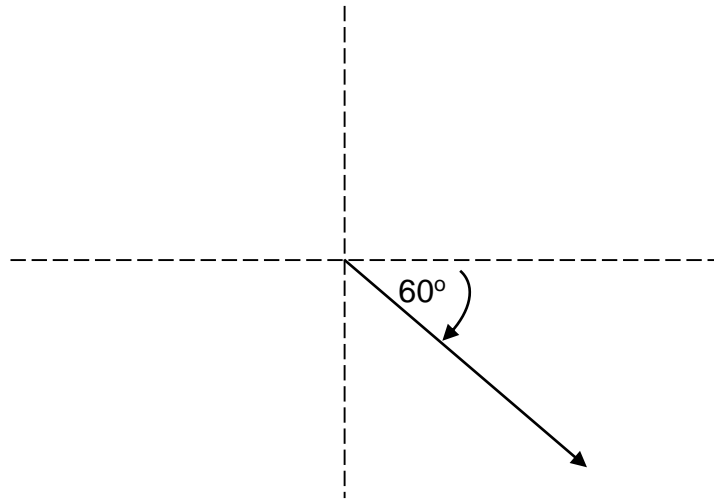
Speed (in km·h⁻¹)	Travel time (in hours)
60	10
100	6
150	4
200	3

3.1   Draw a graph to represent the above information.   (6)

3.2   State if the information above represents a *direct* or *inverse* proportion
         relationship. Use calculations to support the answer.   (5)

[11]

QUESTION 4

4.1   Define the term *resultant vector.*   (2)

4.2   Study the diagram below and answer the questions that follow


Write down the direction of the vector using:

4.2.1   Bearing method   (2)

4.2.2   Compass method   (2)

4.3   Two forces F_1 and F_2 are acting on an object as shown below. Refer to the diagram and answer the questions that follow.

4.3.1   Are the forces above *co-linear* or *co-planar*? Explain the answer   (3)

4.3.2   Calculate the magnitude of the resultant of the two vectors.   (3)

4.4 In order to rescue people from a burning building, a group of fire fighters arrived with a 10 m long ladder. The ladder has to be placed from the base of the building such that it reaches a window 3 m above the ground, as shown in the diagram below.
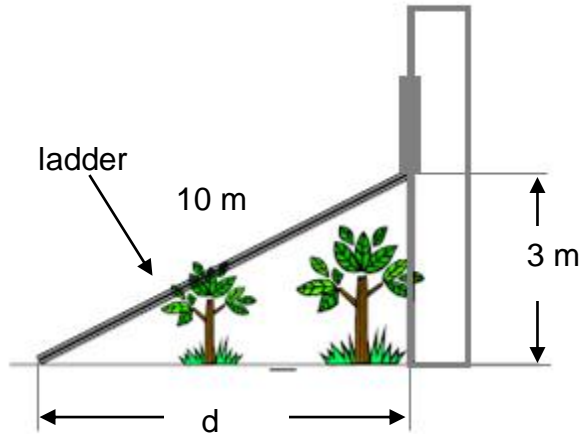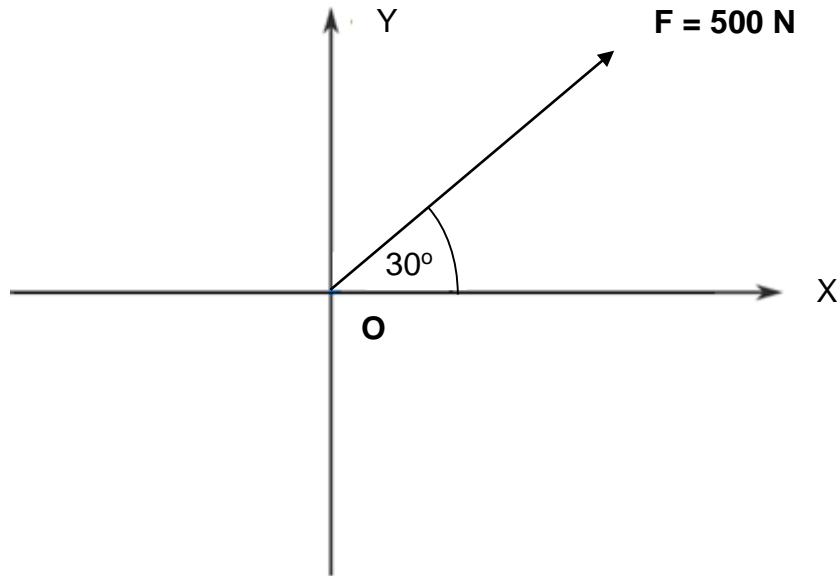

Determine how far from the base of the building the ladder should be placed, so that it reaches the window. (3)

[15]

QUESTION 5

5.1 The diagram below shows a force of 500 N acting at a point **O**

For the above force calculate the:

5.1.1 Horizontal component (3)

5.1.2 Vertical component (3)

5.2 Two forces, **F₁** and **F₂** are exerted simultaneously onto a block in the direction as indicated in the diagram below.
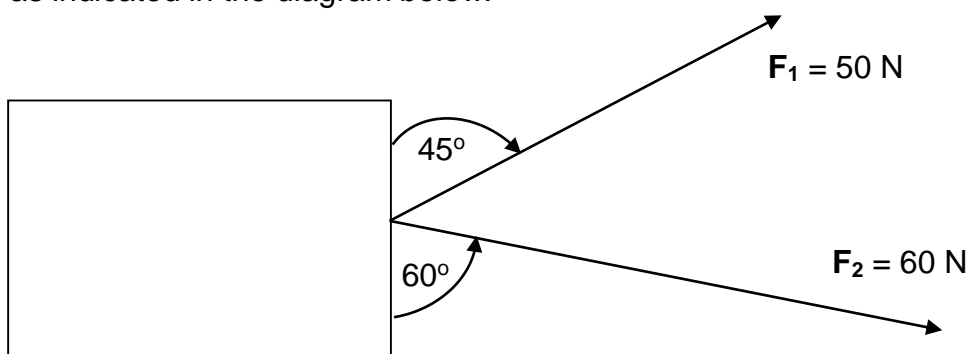
5.2.1 State the *Parallelogram Law of Forces* in words. (2)

5.2.2 By means of ACCURATE SCALE DRAWING, **use the parallelogram law of forces** to determine the magnitude of the resultant of the forces acting on the object above.
Use scale **1 cm : 10 N** (7)

[15]

QUESTION 6

6.1   Define the term *frictional force.*   (2)

6.2   A young girl is pushing a drawer of mass 25 kg to the right, as shown in the diagram below. The coefficient of statistic friction(μ_s) between the drawer and the surface of the floor is 0,12 and the coefficient of kinetic friction (u_k) is 0,10.

6.2.1   Draw a labelled free-body diagram showing ALL the forces acting on the drawer as it moves to the right.   (4)

Calculate the following:

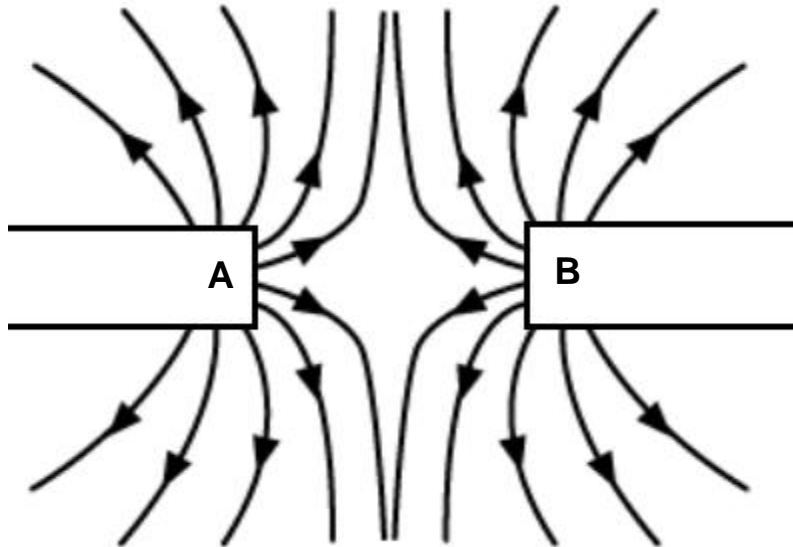6.2.2   Normal force acting on the drawer.   (3)

6.2.3   Static frictional force between the surfaces of the drawer and the Floor.   (3)

6.2.4   Kinetic frictional force between the surface of the drawer and the floor.   (3)

[15]

QUESTION 7

The diagram below shows two poles of a magnet **A** and **B**. When the poles are brought together, the resulting lines are formed.

7.1   Define the term *magnet.*   (2)

7.2   Is pole **A** a North or a South pole? Explain the answer.   (3)

7.3   Write down THREE characteristics of magnetic field lines.   (3)

7.4   You are presented with the following apparatus: bar magnet, blank A4 paper, iron fillings, compass.

      Describe a simple procedure that can be used to show the magnetic field lines and their direction.   (4)

7.5   Name TWO ways in which magnets can lose their magnetism   (2)

7.6   The earth can be referred to as a huge natural magnet. As a result, the Magnetic field lines exist around the earth.

      7.6.1   Write down the name of the magnetic field lines around the earth   (1)

      7.6.2   What is the function of these magnetic field lines?   (2)

7.7   Write down THREE applications of magnets in technology.   (3)
                                                                                                              [20]

QUESTION 8

The diagram below represents a wave produced by a loudspeaker. Study the diagram and answer the questions that follow. The recorded frequency of the wave is 50 Hz.
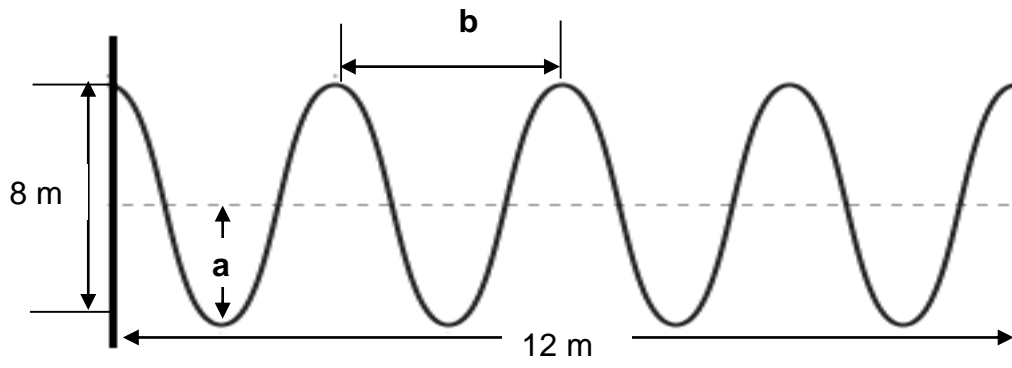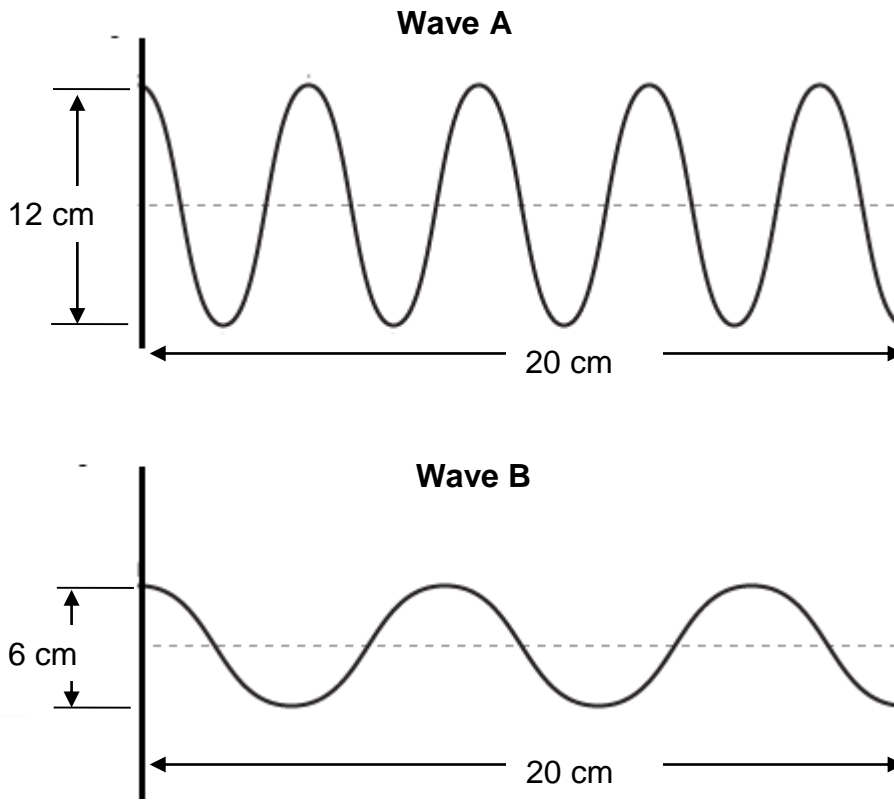

8.1   Define the following terms:

      8.1.1 Crest   (2)

      8.1.2 Amplitude   (2)

      8.1.3 Wavelength   (2)

      8.1.4 Period   (2)

8.2   How many full waves are represented on the diagram above?   (1)

8.3   Write down the NAME of the part labelled:

      8.3.1 **a**   (1)

      8.3.2 **b**   (1)

8.4   Calculate the magnitude of:

      8.4.1 **a**   (2)

      8.4.2 **b**   (2)

8.5   Calculate the:

      8.5.1 Period of the wave   (3)

      8.5.2 Speed of the wave   (3)
[21]

QUESTION 9

The diagrams below are produced by two different speakers. Carefully study the diagrams and answer the questions that follow.

Wave A

12 cm

20 cm

Wave B

6 cm

20 cm

9.1   Define the following terms:

      9.1.1 *Pitch*   (2)

      9.1.2 *Loudness*   (2)

9.2   Which wave represents the LOUDEST sound?
      Explain the answer.   (3)

9.3   Which wave represents a sound with LOW pitch?
      Explain the answer.   (3)
                                                      [10]

QUESTION 10

A group of scientists uses a device which produce sound waves to measure the depth of the sea. They send a wave with a frequency 600 Hz to the bottom of the sea, after 0,3 seconds the wave is received.

The speed of sound in water is 1 525 m·s⁻¹

10.1   Define the following terms:

      10.1.1   *Echo*   (2)

      10.1.2   *Infrasound*   (2)

10.2   Calculate the:

      10.2.1   Wavelength of the sound wave   (3)

      10.2.2   Depth of the sea   (4)

10.3   Write down TWO application of ultrasound in technology   (2)

[13]

TOTAL: 150

DATASHEET FOR TECHNICAL SCIENCES GRADE 11

TABLE 1: PHYSICAL CONSTANTS

NAME	SYMBOL	VALUE
Acceleration due to gravity	g	$9{,}8 \text{ m·s}^{-2}$

TABLE 2: FORMULAE

$\vec{F}_R = \vec{F}_1 + \vec{F}_2$	$\vec{F}_s = \mu_s N$
$\vec{F}_R^{\,2} = \vec{F}_1^{\,2} + \vec{F}_2^{\,2}$	$\vec{F}_s^{\,max} = \mu_s N$
Horizontal Component $\vec{f}_x = \vec{F}\cos\theta$ **Vertical Component** $\vec{f}_y = \vec{F}\sin\theta$	$\vec{F}_k = \mu_k N$

WAVES, SOUND AND LIGHT

$f = \dfrac{1}{T}$	$V = \dfrac{\lambda}{T}$
$T = \dfrac{1}{f}$	$V = f\lambda$
	$V = \dfrac{\Delta \vec{x}}{\Delta t}$