Education and Sport Development

Department of Education and Sport Development
Departement van Onderwys en Sportontwikkeling
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NORTH WEST PROVINCE

PROVINCIAL ASSESSMENT

GRADE 11

TECHNICAL SCIENCES

JUNE 2019

MARKS: 150

TIME: 3 HOURS

This question paper consists of 14 pages including 2 data sheets and 1 graph paper

INSTRUCTIONS AND INFORMATION

1. This question paper consists of 8 questions. Answer ALL questions in the ANSWER BOOK.
2. Start each section on a NEW PAGE in the ANSWER BOOK.
3. Number your answers correctly according to the numbering system used in this question paper.
4. Leave a line between each sub-questions. 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. Answers should be rounded to two decimal places at the end, unless stated otherwise.
10. Write neatly and legibly.

QUESTION 1

Various options are being provided as possible answers to the following questions. Each question has one correct answer. Write only the letter next (A-D) next to the question number (1.1 – 1.10) next to the question number. (e.g. 1.10 – A)

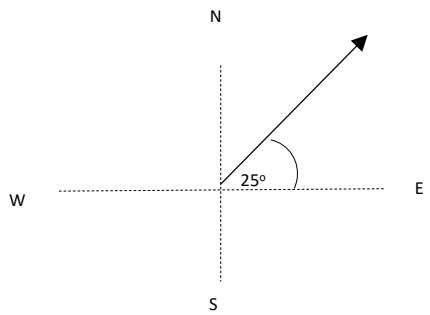
1.1. The SI unit for force is:

A. Kilogram
B. Newton
C. Force
D. Pound (2)

1.2. The side next to the angle θ of a right angle triangle is called the …… side

A. Neighbouring
B. Adjacent
C. Hypotenuse
D. Opposite (2)

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



A. North East
B. Bearing of 65°
C. Bearing of 115°
D. 25° North of east (2)

1.4. Kinetic frictional force is a type of frictional force which acts when an object and the surface when the object is…

A. rolling
B. stationary
C. falling
D. sliding (2)

1.5. Which of the following is a ferromagnetic material

A. Carbon Rod
B. Iron fillings
C. Rubber pieces
D. Diamond pieces (2)

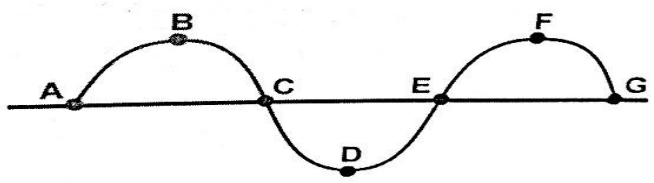
1.6. Which one of the following statement is NOT TRUE about the magnetic field lines of a magnet? Magnetic field lines must…

A. always point from south to north
B. never touch or cross one another
C. must always be evenly spaced
D. always point from north to south (2)

1.7. Sound waves are an example of …

A. longitudinal waves.
B. surface waves.
C. electromagnetic waves.
D. transverse waves. (2)

1.8. Indicate any two points that are in phase.



A. [A&D]
B. [D&G]
C. [B&F]
D. [C&E] (2)

[16]

QUESTION 2

Use the information on the table to answer the questions that follow.

Speed (km/h)	Travel time (h)
30	10
50	6
75	4
100	3

2.1. In the graph sheet provided, represent the above information in a graph (6)

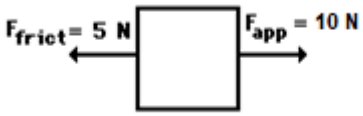
2.2. Does the above information represent a direct or inverse proportion?
Briefly support your answer by referring to the graph or by calculations. (3)

[9]

QUESTION 3

3.1. Define the term *resultant* (2)

3.2. Consider the following forces acting on an object

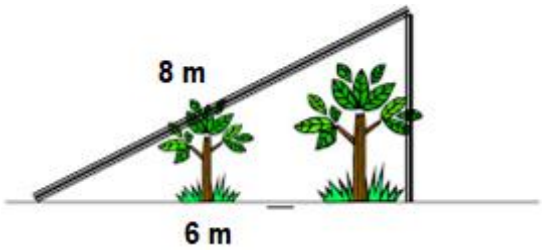


3.2.1. Draw a free-body diagram indicating ALL the forces acting on the object. (4)

3.2.2. Determine the magnitude of the resultant of the forces acting on the object. (3)

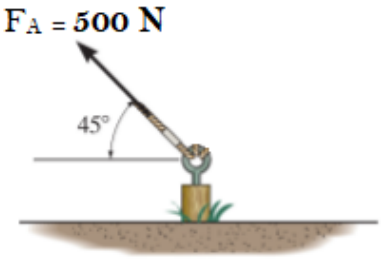
3.2.3. Using scale of 1cm: 1N draw a vector diagram representing the horizontal forces acting on the object above (3)

3.3. A ladder of 8m long leans against the wall right at the tip where the roofing of the house starts. The other end of the ladder rests on the ground 6 meters from the bottom of the wall.



Calculate the height of the wall. (4)

3.4. A force F_A is applied to remove a pin from the ground as shown below.



Determine the:

3.4.1. *X* component (3)
3.4.2. *Y* component (3)
3.4.3. Represent the above calculated components on a vector diagram (3)

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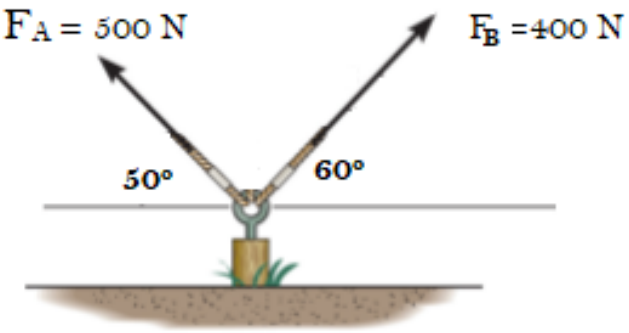
QUESTION 4

Consider the diagram where two forces F_A and F_B are now used in order to remove the pin from the ground. The angles of the forces are adjusted as shown below.



4.1. Determine the:

4.1.1. X components of F_A and F_B (5)

4.1.2. Y components of F_A and F_B (5)

4.2. Determine the magnitude of the resultant of the force (5)

4.3. Using the bearing method, determine the direction of the resultant. (5)

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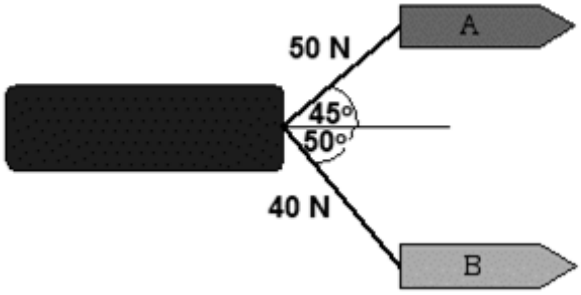
QUESTION 5

Two tag boats are used to move a cargo to the shore of the ocean. The force and the angle at which the force is applied by each tag boat is as indicated below. The tag boats and the cargo moves at constant velocity.



5.1. Draw a free body diagram representing all the forces applied by the two tag boats on the cargo. (2)

5.2. Using a tail-to-tail(parallelogram) or tail-to-head **sketch**(not to scale) draw a **sketch** representing the resultant of the forces acting on the cargo (3)

5.3. Determine, by ACCURATE CONSTRUCTION AND MEASUREMENT the magnitude of the force applied by the cargo on the tag boats.
Use scale 1cm: 5 N (7)

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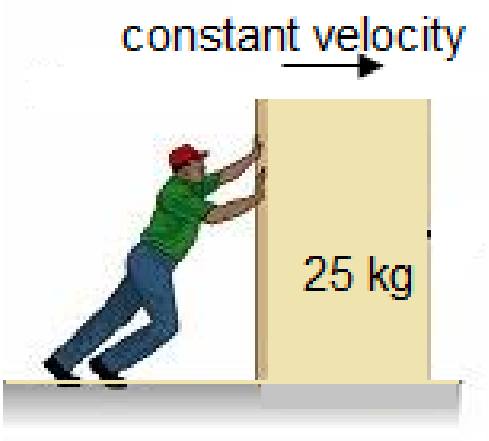
QUESTION 6

6.1. Define the following terms:

6.1.1. *Static* friction (2)

6.1.2. *Normal* Force (2)

6.2. A man is pushing a box of 25 kg to the right to try and move a box as indicated in the drawing below. The coefficient of static friction(μ_s) between the box and the surface of the floor is 0.2



The box does **not** move

6.2.1. Draw a labelled free-body diagram indicating all the forces acting on the box. (4)

6.2.2. Calculate the normal force exerted by floor on the box (3)

6.2.3. Calculate the maximum force that the man must apply before the box could start to move (3)

[14]

QUESTION 7

7.1. Define the term *magnet.* (2)

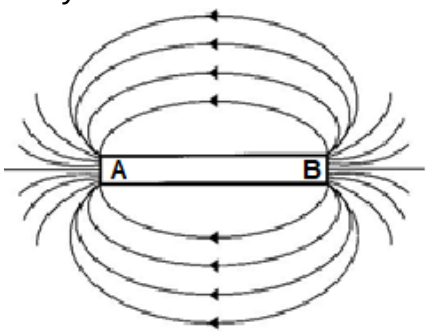
7.2. Magnets have invisible lines around them…

7.2.1. What are this lines called? (1)

7.2.2. Describe a simple procedure that can be used show the lines and their direction around a magnet. (4)

7.3. Give three characteristics of the lines mentioned in 7.2.1. (3)

7.4. Below is an example of a simple bar magnet with poles A and B. The magnet is not completely correct.



7.4.1. Name the pole represented by each letter (2)

7.4.2. Identify the mistake on the above sketch (1)

7.4.3. Re-draw and correct the sketch, clearly indicate the poles on your drawing (2)

7.5. Name three ways in which magnets can lose their magnetism (3)

7.6. The earth can be referred to as a huge natural magnet. As a result the lines mentioned in 7.2.1 exists around the earth.

7.6.1. What is the name given to this lines around the earth? (1)

7.6.2. Discuss the main function of the this lines mentioned in 7.6.1 (2)

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QUESTION 8

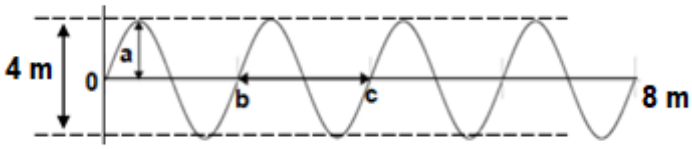
8.1. Define the following:

8.1.1. Wavelength (2)
8.1.2. Crest (2)
8.1.3. Period (2)
8.1.4. Amplitude (2)
8.1.5. Constructive interference (2)

8.2. Consider the diagram below showing pulse A and B moving towards each other.

8.2.1. State the principle of superposition. (2)
8.2.2. Use the above principle to calculate the resulting amplitude. (2)
8.2.3. Draw a sketch representing the pulse that results from the interference of the two waves (2)

8.3. Refer to the diagram below which represent a wave produced by a loud speaker and answer the questions that follow.



8.3.1. Give the relevant name of the Part labelled **a** (1)

8.3.2. How many full waves are presented on the diagram above (1)

8.4. Calculate the magnitude of the…

8.4.1. distance **b-c** (2)

8.4.2. magnitude of **a** (2)

8.5. While on vacation Vincent visits a valley site. Standing next to the other wall of the valley he shouts facing the side far opposite him and the sound returns to him after 6 seconds. The speed of sound on the day is 343 m/s. The frequency of the wave is 600Hz.

8.5.1. What is the period of the wave (3)
8.5.2. What is the wavelength of the wave (3)
8.5.3. Calculate the distance between the sides of the valley (4)

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[TOTAL: 150]

DATA FOR TECHNICAL SCIENCES GRADE 11

GEGEWENS VIR TEGNIESE WETENSKAPPE GRAAD 11

TABLE 1: PHYSICAL CONSTANTS/TABEL1: FISIESE KONSTANTES

NAME/NAAM	SYMBOL/SIMBOOL	VALUE/WAARDE
Acceleration due to gravity Swaartekragversnelling	g	9,8 m·s^{-2}
Charge on electron Lading op electron	-e	-1,6x10^{-19}C

TABLE 2: FORMULAE/TABEL 2: FORMULES

MOTION	**VECTORS**	**FORCE**
Speed = distance/time $s = \frac{d}{t}$	$\vec{F}_R = \vec{F}_1 + \vec{F}_2$ $\vec{F}_R^2 = \vec{F}_1^2 + \vec{F}_2^2$	$\vec{F}_{net} = m\vec{a}$ $\vec{F}_s = \mu_s N$
velocity= displacement/time $\vec{V} = \frac{\Delta\vec{x}}{\Delta t}$	**Horizontal Component** $\vec{F}x = \vec{F}\cos\theta$	$\vec{F}_s^{max} = \mu_s N$ $\vec{F}_k = \mu_k N$
Acceleration = change in velocity / time $\vec{a} = \frac{\Delta\vec{v}}{\Delta t}$	**Vertical Component** $\vec{F}y = \vec{F}\sin\theta$	

ENERGY	**ELECTRICITY & ELECTROSTATICS**	
$Ep = mgh$ $Ek = \frac{1}{2}mv^2$	$I = \frac{Q}{\Delta t}$ $V = \frac{W}{\Delta t}$ $V = IR$	$Q = \frac{Q1 + Q2}{2}$ $E = \frac{V}{d}$ $C = \frac{Q}{V}$
	Parallel Circuit	**Series Circuit**
	$\frac{1}{RT} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3} + \ldots$ $Rp = \frac{R1 \times R2}{R1 + R2}$ $VT = V1 = V2 = V3 = \cdots$ $IT = I1 + I2 + I3 + \cdots$	$R_T = R_1 + R_2 + R_3 + \ldots$ $VT = R1 + R2 + R3 + \cdots$ $IT = I1 = I2 = I3 = \cdots$

WAVES, SOUND AND LIGHT/*GOLWE, KLANK EN LIG*

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

Name:_____

Question 2.1

Surname:_____

Grade:_____