



education

Department of
Education
FREE STATE PROVINCE

CONTROL TEST 1

GRADE 10

TECHNICAL SCIENCES

MARCH 2016

MARKS: 100

TIME: 2 HOURS

This paper consists of TEN pages and TWO data sheets.

INSTRUCTIONS AND INFORMATION

1. Write your name and other information in the appropriate spaces on the ANSWER BOOK.
2. This question paper consists of SEVEN questions. Answer ALL the questions in the ANSWER BOOK.
3. Start EACH question on a NEW page in the ANSWER BOOK.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Leave one line between two sub-questions, for example between QUESTION 2.1 and QUESTION 2.2.
6. You may use a non-programmable pocket calculator.
7. You may use appropriate mathematical instruments.
8. You are advised to use the attached DATA SHEETS.
9. Show ALL formulae and substitutions in ALL calculations.
10. Round off your final numerical answers to a minimum of TWO decimal places where applicable.
11. Give brief motivations, discussions, et cetera where required.
12. Write neatly and legibly.

QUESTION 1: MULTIPLE CHOICE QUESTIONS.

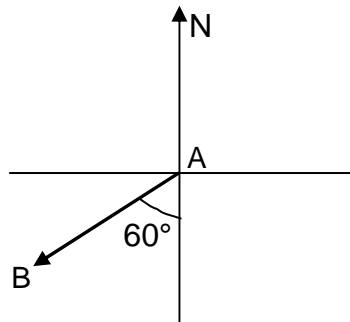
Four options are provided as possible answers to the following questions. Each question has only ONE correct answer. Choose the answer and write only the letter A, B, C or D next to the question number (1.1 – 1.10) in the ANSWER BOOK.

- 1.1 Which one of the following materials is a poor conductor of electricity?
- A Aluminium
 - B Iron
 - C Zinc
 - D Porcelain (2)
- 1.2 Which one of the following is NOT a way matter changes phase?
- A Melting
 - B Freezing
 - C Evaporation
 - D Mixing (2)
- 1.3 What is the SI unit of velocity?
- A s^{-2}
 - B $m \cdot s^{-1}$
 - C $m \cdot s^{-2}$
 - D $kg \cdot m \cdot s^{-2}$ (2)
- 1.4 A pile of steel has a mass of 3,6 metric tonne. How many kilogram of steel is this if 1 metric tonne has a mass of 1 000 kg?
- A $\frac{3,6}{1000}$
 - B $3,6 \times 10$
 - C $3,6 \times 1\,000$
 - D $3,6 \times 10\,000$ (2)

1.5 1 km is equal to ... cm.

- A 100
- B 1 000
- C 100 000
- D 1 000 000 (2)

1.6 AB in the diagram below is a vector with a direction of 60° west of south.



The direction of vector AB can be written as a bearing of ...

- A 060° .
- B 120° .
- C 210° .
- D 240° . (2)

1.7 Which one of the following represents the longest distance?

- A $4,2 \times 10^{-2} \text{ m}$
- B $4,2 \times 10^{-7} \text{ m}$
- C $4,2 \times 10^{-8} \text{ m}$
- D $4,2 \times 10^{-9} \text{ m}$ (2)

1.8 Which one of the following physical quantities is a scalar?

- A Time
- B Velocity
- C Force
- D Weight (2)

1.9 A truck is travelling at a constant speed of $72 \text{ km} \cdot \text{h}^{-1}$. What is the speed of the truck in $\text{m} \cdot \text{s}^{-1}$?

- A $\frac{72}{60 \times 60}$
- B $\frac{72000}{60 \times 60}$
- C $72 \times 60 \times 60$
- D $72\,000 \times 60 \times 60$ (2)

1.10 Which one of the following correctly represents a balanced equation for the reaction between methane (CH_4) and oxygen gas (O_2)?

- A $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
 - B $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$
 - C $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 - D $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$ (2)
- [20]**

QUESTION 2

Consider the following units.

cm	m	kg	s	N	$\text{m}\cdot\text{s}^{-2}$
N.s	cm^3	$\text{m}\cdot\text{s}^{-1}$			

2.1 Which unit from the list above would be suitable for measuring:

2.1.1 the mass of a hammer; (1)

2.1.2 the rate at which distance is covered; and (1)

2.1.3 the force a learner exerts on a chair he is sitting on? (1)

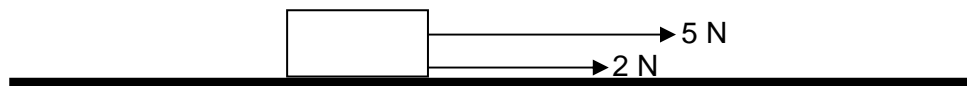
2.2 Conversion of units from one form to another is common in our daily lives. Convert 10 milligram (mg) to gram (g) and show your calculation. (2)

[5]

QUESTION 3

3.1 Two forces are acting simultaneously on an object.

3.1.1 In the first case the two forces are acting in the SAME direction as shown below.



Use a scale of 10 mm to represent 1 N and determine the resultant of the two forces graphically (by means of a construction). (4)

3.1.2 In the second case the two forces are acting in OPPOSITE directions as shown below.

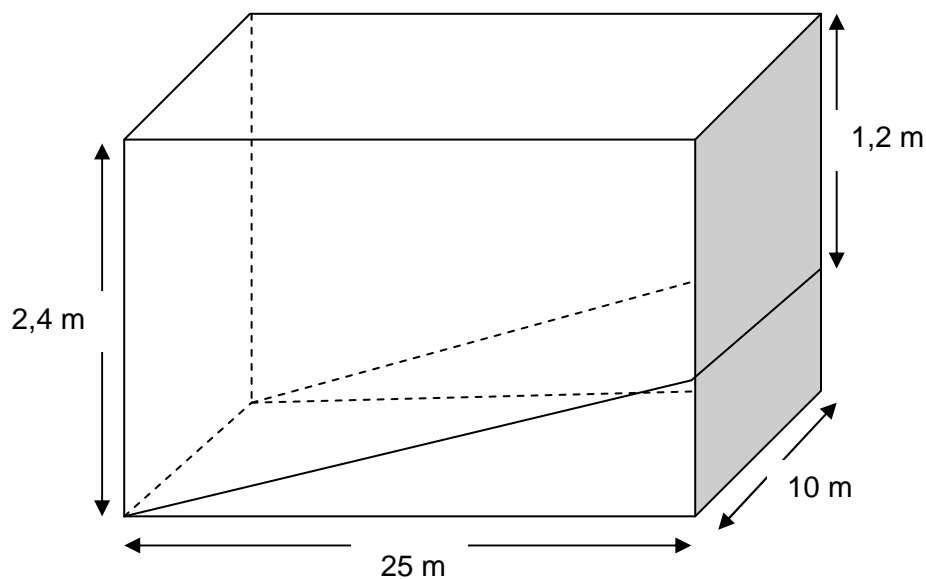


Use a scale of 10 mm to represent 1 N and determine the resultant of the two forces graphically (by means of a construction). (4)

- 3.2 Fred wishes to determine the thickness of normal printing paper. He measures the thickness of one ream of paper, which has 500 sheets, and find that it is 5,3 cm.
- 3.2.1 Calculate the thickness of ONE SHEET of paper in centimetre (cm). (2)
- 3.2.2 Write down the answer to question 3.2.1 in SCIENTIFIC NOTATION. (1)
- 3.2.3 Convert the answer to question 3.2.1 to millimetre (mm). Show your calculation. (2)
- [13]**

QUESTION 4

- 4.1 A rectangular tank has base measurements of 50 cm and 100 cm. The volume of the tank is $7,5 \times 10^5 \text{ cm}^3$. Calculate the height of the tank in centimetre (cm). (3)
- 4.2 A farmer wants to fence his yard. The yard has a rectangular shape. The length of the fence is 220 m. One side of the yard is 40 m long. Calculate the length of the other side of the yard perpendicular to the 40 m. (4)
- 4.3 A rectangular living room has an area of $1,2 \times 10^5 \text{ cm}^2$. One floor tile has dimensions of 30 cm by 30 cm. How many tiles are needed to tile the living room? (4)
- 4.4 A swimming pool has a rectangular shape. It is 25 m long and 10 m wide. The bottom of the pool slopes down from the shallow end to the deep end. At the shallow end it is 1,2 m deep from the water line. At the deep end it is 2,4 m deep from the water line.



Calculate the volume of water in cubic metre that is needed to fill the pool. (4)

- 4.5 A learner wants to determine which one of copper or gold can float on mercury. He takes a cube of copper and a cube of gold with the same dimensions. These are as follows:

Length = 1,5 cm

Width = 1,5 cm

Height = 1,5 cm.

The mass of the copper is 30,11 g and the mass of the gold is 65,21 g. The density of mercury is $13,53 \text{ g}\cdot\text{cm}^{-3}$. Determine by means of a calculation which one can float on the mercury.

(6)

[21]

QUESTION 5

Nancy investigates some properties of the materials listed in the table below in order to classify them as metals, non-metals or metalloids.

- Drinking straw
- Wooden ruler
- Plastic pen
- Paper clip (made from an alloy)
- Silicon
- Copper
- Iodine

- 5.1 What is meant by the term *metalloid*? (2)

- 5.2 From the above-mentioned list of materials, write down one which:

- 5.2.1 is a metalloid; (1)

- 5.2.2 is magnetic; and (1)

- 5.2.3 is brittle. (1)

- 5.3 State how an increase in temperature influences the electrical conductivity of each of the following (only write down INCREASES, DECREASES or NO EFFECT):

- 5.3.1 Metals (1)

- 5.3.2 Non-metals (1)

[7]

QUESTION 6

The table below shows some PHYSICAL PROPERTIES of materials we use in our everyday lives.

Substance	Melting point (°C)	Boiling point (°C)	Density (g·cm ⁻³)	Electrical conductivity	Hardness
Ethene	-169	-104	0,61	Poor	-
Water	0	100	1,00	Poor	-
Aluminium	660	4 473	2,7	36,9	Hard
Copper	1 084	4 667	8,9	58,5	Hard
Iron	1 127	5 198	7,9	10,1	Hard

6.1 Which one of the substances is:

6.1.1 a liquid at a temperature of 25°C? (1)

6.1.2 a gas at a temperature of 25°C? (1)

6.2 Aluminium is used to make body parts of aeroplanes. Explain by referring to the PROPERTIES LISTED in the table why aluminium is used for this purpose. (2)

6.3 Which one of the materials is the most suitable for use in electrical cables? (1)

6.4 Explain the answer to question 6.3 by referring to the PROPERTIES LISTED in the table. (2)

6.5 When water is heated it changes from liquid to gas.

6.5.1 Is this change a physical or chemical change? Write only PHYSICAL or CHEMICAL. (1)

6.5.2 Explain the answer to question 6.5.1. (2)

6.6 Explain the difference between an element and a compound. (4)
[14]

QUESTION 7

The table shows some chemical substances.

A NH_4^+	B Na	C Cu^{2+}	D NO_3^-
E OH^-	F CaCO_3	G H_2S	H Cl

7.1 Write down the letter of:

7.1.1 a metallic element. (1)

7.1.2 a non-metallic element. (1)

7.1.3 the hydroxide ion. (1)

7.1.4 an ionic compound. (1)

7.1.5 a cation. (1)

7.1.6 an anion. (1)

7.2 Write down the FORMULA of a compound formed between:

7.2.1 **C** and **D**. (2)

7.2.2 **A** and **E**. (2)

7.3 Write down the NAME of compound:

7.3.1 **F** (2)

7.3.2 **G** (2)

7.4 Rewrite the following UNBALANCED or PARTLY BALANCED equations in your answer book and balance each one.

7.4.1 $\text{Cu} + \text{O}_2 \rightarrow \text{CuO}$ (2)

7.4.2 $\text{N}_2 + \text{H}_2 \rightarrow \text{NH}_3$ (2)

7.4.3 $4\text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3$ (2)

[20]

GRAND TOTAL: 100

**DATA FOR TECHNICALSCIENCES GRADE 10
CONTROL TEST 1**

**GEGEWENS VIR TEGNIESE WETENSKAPPE GRAAD 10
KONTROLTOETS 1**

TABLE 1: FORMULAE / TABEL 1: FORMULES

Perimeter of a rectangle <i>Omtrek van 'n reghoek</i>	Perimeter = $2l + 2w$ <i>Omtrek = $2l + 2b$</i>
Area of a triangle <i>Oppervlakte van 'n driehoek</i>	$\text{Area} = \frac{1}{2}bh$ $\text{Oppervlakte} = \frac{1}{2}bh$
Area of a square <i>Oppervlakte van 'n vierkant</i>	Area = side x side <i>Oppervlakte = sy x sy</i>
Area of a trapegium <i>Oppervlakte van 'n trapesium</i>	Area = $\frac{1}{2}(\text{sum of parallel sides}) \times$ perpendicular distance in between <i>Oppervlakte = $\frac{1}{2}(\text{som van ewewydige sye}) \times$ loodregte afstand tussen-in</i>
Volume of an object <i>Volume van 'n voorwerp</i>	Volume = area of base x height <i>Volume = oppervlakte van basis x hoogte</i>
Volume of a cube <i>Volume van 'n kubus</i>	Volume = side x side x side <i>Volume = sy x sy x sy</i>
Density of an object <i>Digtheid van 'n voorwerp</i>	$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$ $\text{Digtheid} = \frac{\text{Massa}}{\text{Volume}}$

TABLE 2: THE PERIODIC TABLE OF ELEMENTS
TABEL 2: DIE PERIODIEKE TABEL VAN ELEMENTE

1 (I)	2 (II)	3	4	5	6	7	8	9	10	11	12	13 (III)	14 (IV)	15 (V)	16 (VI)	17 (VII)	18 (VIII)
<p>KEY/SLEUTEL</p> <p>Atomic number <i>Atoomgetal</i></p> <p>Electronegativity <i>Elektronegatiwiteit</i></p> <p>Symbol <i>Simbool</i></p> <p>Approximate relative atomic mass <i>Benaderde relatiewe atoommassa</i></p>																	
2,1 1 H 1							29 Cu 63,5										2 He 4
1,0 3 Li 7	1,5 4 Be 9											2,0 5 B 11	2,5 6 C 12	3,0 7 N 14	3,5 8 O 16	4,0 9 F 19	10 Ne 20
0,9 11 Na 23	1,2 12 Mg 24											1,5 13 Al 27	1,8 14 Si 28	2,1 15 P 31	2,5 16 S 32	3,0 17 Cl 35,5	18 Ar 40
0,8 19 K 39	1,0 20 Ca 40	1,3 21 Sc 45	1,5 22 Ti 48	1,6 23 V 51	1,6 24 Cr 52	1,5 25 Mn 55	1,8 26 Fe 56	1,8 27 Co 59	1,8 28 Ni 59	1,9 29 Cu 63,5	1,6 30 Zn 65	1,6 31 Ga 70	1,8 32 Ge 73	2,0 33 As 75	2,4 34 Se 79	2,8 35 Br 80	36 Kr 84
0,8 37 Rb 86	1,0 38 Sr 88	1,2 39 Y 89	1,4 40 Zr 91	41 Nb 92	1,8 42 Mo 96	1,9 43 Tc	2,2 44 Ru 101	2,2 45 Rh 103	2,2 46 Pd 106	1,9 47 Ag 108	1,7 48 Cd 112	1,7 49 In 115	1,8 50 Sn 119	1,9 51 Sb 122	2,1 52 Te 128	2,5 53 I 127	54 Xe 131
0,7 55 Cs 133	0,9 56 Ba 137	57 La 139	1,6 72 Hf 179	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	1,8 81 Tl 204	1,8 82 Pb 207	1,9 83 Bi 209	2,0 84 Po	2,5 85 At	86 Rn
0,7 87 Fr	0,9 88 Ra 226	89 Ac															
58 Ce 140	59 Pr 141	60 Nd 144	61 Pm	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175				
90 Th 232	91 Pa	92 U 238	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr				