



education

Department of
Education
FREE STATE PROVINCE

PROVINCIAL CONTROL TEST

GRADE 10

TECHNICAL SCIENCES

MARCH 2017

MARKS: 100

TIME: 2 HOURS

This paper consists of nine 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 six 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 combinations is correct to classify displacement, speed and velocity as scalars or vectors?

	Displacement	Speed	Velocity
A	Scalar	Scalar	Scalar
B	Scalar	Vector	Scalar
C	Vector	Vector	Vector
D	Vector	Scalar	Vector

(2)

- 1.2 Which one of the following has the same value as $1,534 \times 10^{-2}$?

A 0,001534

B 0,01534

C 15,34

D 153,4

(2)

- 1.3 1 000 mm³ is equal to ... l.

A 1

B 0,1

C 0,001

D 0,0001

(2)

- 1.4 A car travels at a constant speed of 122 km·h⁻¹. What is the speed of the car in m·s⁻¹?

A $\frac{122}{60 \times 60}$

B $\frac{122 \times 1000}{60 \times 60}$

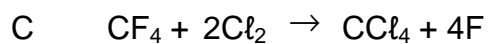
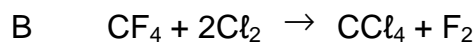
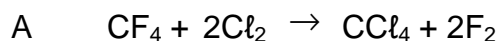
C 122 x 60 x 60

D 122 x 1000 x 60 x 60

(2)

- 1.5 Which one of the following represents the correct CGS value for 2 hours 3 minutes and 40 seconds?
- A 2,061 h
 - B 123,67 min
 - C 7 420 s
 - D 2:03:40 (2)
- 1.6 Which one of the following is INCORRECT? If 1 000 000 000 nC is the same as 1 C, then... C is the same as 0,0234 nC.
- A $\frac{0,0234}{1\,000\,000\,000}$
 - B $0,0234 \times 1\,000\,000\,000$
 - C $0,0234 \times 10^{-9}$
 - D $2,34 \times 10^{-11}$ (2)
- 1.7 Which one of the following elements is an example of an alkaline metal?
- A Mg
 - B B
 - C Ca
 - D K (2)
- 1.8 Which one of the following is NOT a property of materials?
- A Ductile
 - B Malleable
 - C Waterproof
 - D Thermal conductivity (2)

1.9 Which one of the following is the correct representation of a balanced equation for the reaction between carbon tetrafluoride (CF_4) and chlorine gas (Cl_2)?



1.10 Which one of the following statements regarding boiling and evaporation is INCORRECT?

A Boiling and evaporation take place at specific temperatures.

B Boiling occurs throughout the liquid, while evaporation occurs only at the surface of the liquid.

C Liquids boil at specific temperatures, but evaporate at any temperature.

D With boiling and evaporation there is a phase change from liquid to gas. (2)

[20]

QUESTION 2

2.1 Consider the following units and answer the questions that follow:

m	kg.m.s ⁻²	km	h
g	kg	m.s ⁻¹	m.s ⁻²

2.1.1 Give ONE CGS unit from the list. (1)

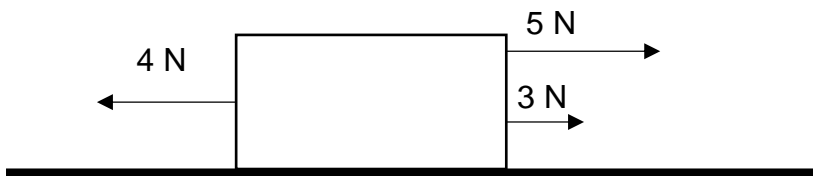
2.1.2 Which SI unit will be used to measure the rate of change of distance? (1)

2.1.3 Name the quantity measured in QUESTION 2.1.2. (1)

2.1.4 Convert 1350 g to kg. (2)

2.1.5 Convert 125 m.s⁻¹ to km.h⁻¹ and give the answer in SCIENTIFIC NOTATION. (4)

2.2 Three forces are acting simultaneously on an object, as shown in the diagram.



2.2.1 Explain the difference between a *vector* and a *scalar*. (2)

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

2.2.3 Use a scale of 1 cm to represent 1 N and determine the resultant force of the three forces graphically by means of a construction. (4)

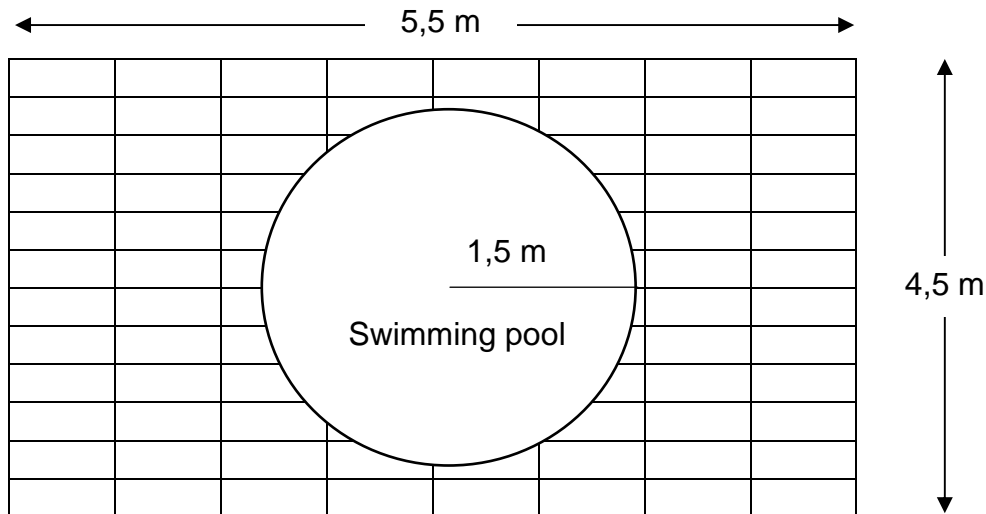
2.2.4 What will the effect on the magnitude of the resultant be if the 5 N force on the object is removed? Write down only INCREASE, DECREASE or REMAIN THE SAME. (1)

2.2.5 Briefly DESCRIBE what the effect on the resultant will be if a FOURTH horizontal force is applied to the object from right to left? (3)

[21]

QUESTION 3

A home owner wants to build a swimming pool at his house. The swimming pool must be round with a constant radius of 1,5 m and a constant depth. The maximum volume of the pool must be 16 000 ℓ. The owner also wants to pave a rectangular area of 5,5 m by 4,5 m around the swimming pool as shown below, and he wants to erect a fence around the rectangular paved area.



- 3.1 Calculate the DEPTH of the swimming pool if 1 000 ℓ of water fills a volume of 1 m³. (4)
- 3.2 Calculate the VOLUME of water needed to fill the pool to 85% of its maximum capacity. (2)
- 3.3 It takes 38 hours to fill the swimming pool to 85% of its maximum capacity. Calculate the RATE of water flow in litre per minute. (3)
- 3.4 Calculate the AREA that must be paved. (6)
- 3.5 How MANY rectangular paving stones are needed to pave the area if ONE paving stone's dimensions are 10 cm by 20 cm? (4)
- 3.6 Calculate the COST of the paving stones if one stone costs R 2,50. (2)
- 3.7 Calculate the length of the fence that is needed. (3)
- 3.8 On a particular day the water temperature in the pool is 24°C, but somebody wants to know how much it is in °F. No thermometer is available, but the following formula is: $T_{°F} = \frac{9T_{°C}}{5} + 32$
 - 3.8.1 Use the formula to calculate the water temperature in °F. (3)
 - 3.8.2 Without any further calculation; how much is 0°C expressed as °F? (1)

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QUESTION 4

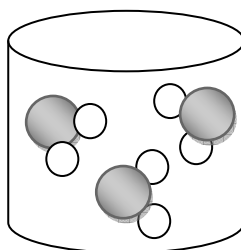
- 4.1 A learner uses the following list of substances to investigate the properties of materials: glass, nickel, plastic, iron, graphite and aluminium

Choose from the above-mentioned list (each substance may only be used ONCE) ONE substance with the following property(ies):

- 4.1.1 A good insulator (1)
- 4.1.2 Heavy and malleable (1)
- 4.1.3 Magnetic (1)
- 4.1.4 Brittle (1)
- 4.1.5 Light and ductile (1)
- 4.2 Pure substances can be classified as elements or compounds.
- 4.2.1 Describe what a *compound* is. (2)

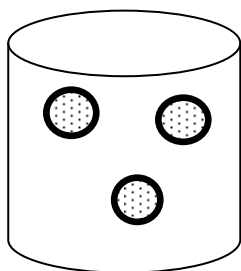
- 4.2.2 Consider the following diagrams. Each container either contains an element or a compound. Write down the name of each container and next to it either ELEMENT or COMPOUND to indicate what is in the container.

Container 1



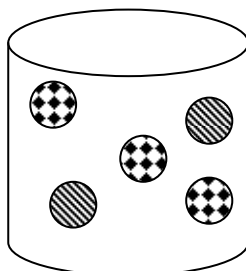
(1)

Container 2



(1)

Container 3



(1)
[10]

QUESTION 5

The following table shows certain chemical substances and each one is represented by a letter from **A** to **I**.

A	B	C	D	E	F	G	H	I
OH ⁻	O	Na ⁺	He	B	SO ₄ ²⁻	Pb(SO ₃) ₂	Zn	S

5.1 Write down the LETTER (**A**, **B**, **C**, etc.) that represents the following:

5.1.1 Metal (1)

5.1.2 Non-metal (1)

5.1.3 Metalloid (1)

5.1.4 Noble gas (1)

5.1.5 Compound (1)

5.1.6 Cation (1)

5.2 Write down the chemical FORMULA of the compound that forms between **C** and **F**. (1)

5.3 Give the chemical NAME of **G** by using the Stock notation. (2)

5.4 Give the chemical NAME of the compound that forms when three atoms of oxygen (**B**) bonds with one atom of sulphur (**I**). (2)

5.5 Give the NAME of the ion represented by **F**. (1)

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QUESTION 6

Rewrite each of the following UNBALANCED equations in your answer book and balance them.

6.1 $\text{Ba(OH)}_2 + \text{HNO}_3 \rightarrow \text{Ba(NO}_3)_2 + \text{H}_2\text{O}$ (2)

6.2 $\text{Mg} + \text{Br}_2 \rightarrow \text{MgBr}_2$ (1)

6.3 $\text{Li} + \text{HCl} \rightarrow \text{LiCl} + \text{H}_2$ (3)

6.4 $\text{Al} + \text{O}_2 \rightarrow \text{Al}_2\text{O}_3$ (3)

[9]

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 circle <i>Oppervlakte van 'n sirkel</i>	Area = πr^2 <i>Oppervlakte = πr^2</i>
Area of a rectangle <i>Oppervlakte van 'n reghoek</i>	Area = $l \times w$ <i>Oppervlakte = $l \times b$</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>
Average speed of an object <i>Gemiddelde spoed van 'n voorwerp</i>	Average speed = $\frac{\text{Distance}}{\text{Time}}$ <i>Gemiddelde spoed = $\frac{\text{Afstand}}{\text{Tyd}}$</i>
Average velocity of an object <i>Gemiddelde snelheid van 'n voorwerp</i>	Average velocity = $\frac{\text{Displacement}}{\text{Time}}$ <i>Gemiddelde snelheid = $\frac{\text{Verplasing}}{\text{Tyd}}$</i>

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							29 1,9 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		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		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	