MAURITIUS EXAMINATIONS<br>SYNDICATE

# NATIONAL CERTIFICATE OF EDUCATION <br> <br> MATHEMATICS 

 <br> <br> MATHEMATICS}

Specimen paper for first assessment in October 2020

## Acknowledgments

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## 1. Background

At the end of the Nine-Year Continuous Basic Education (NYCBE) cycle, all students from the Regular and Extended programmes take the National Certificate of Education (NCE) Assessment. This assessment is in line with the philosophy defined in the National Curriculum Framework (NCF) Grades 7, 8 and 9 (MIE, 2016) and the learning outcomes (LOs) detailed in the NCF Syllabus Grades 7, 8 \& 9 (TLS) (MIE, 2019).

The assessment will be carried out in the following subjects:

- English
- Mathematics
- French
- Science
- Information and Communication Technology (ICT)
- Technology Studies
- Business and Entrepreneurship Education (BEE)
- Social and Modern Studies (SMS)
- Art and Design
- An optional core subject (Asian Languages, Arabic and Kreol Morisien, if chosen by the candidate)

A 7-point Grading structure will be used in each subject, as illustrated in Table 1 below.

| Numerical <br> Grade | Marks |
| :---: | :---: |
| 1 | 85 and above |
| 2 | 75 and above but below 85 |
| 3 | 65 and above but below 75 |
| 4 | 55 and above but below 65 |
| 5 | 45 and above but below 55 |
| 6 | 35 and above but below 45 |
| 7 | Less than 35 |

Table 1: Grading Structure for the NCE Assessment

## 2. Purpose of the NCE Assessment

The main purpose of the NCE Assessment is to measure and certify learning that has taken place at the end of the NYCBE cycle. The information gathered from the assessment will be used for:

- Certification

Meeting the minimum requirements on the NCE Assessment (see the Award Rules in the Annual Programme for the National Certificate of Education (NCE) Assessment for 2020) will lead to the candidate being conferred an NCE certificate which will be recognised at Level 2 on the National Qualifications Framework (NQF).

## - Promotion to Grade 10

Assessment results from the NCE will guide schools in determining whether students get promoted to Grade 10.

## - Orientation

The NCE assessment will provide information to guide students as to whether they want to continue in the general or in the technical/vocational stream. Within the general stream, it may guide students in their choice of subjects as from Grade 10.

## - Admission to Academies.

Performance in the NCE Assessment will determine whether candidates are admitted to academies.

The following extract from the Education Act indicates the criteria for admission to academies:

Priority of admission to Grade 10 in an Academy shall be determined on the basis of the grade aggregate and the relative performance of the eligible pupil in the best 8 core subjects, including English, French and Mathematics, at the NCE assessment and the choice of the responsible party ...

## 3. Guiding principles in Assessment

A number of key principles of assessment guided the development of the NCE Assessment (Standards for Educational and Psychological Testing, 2014).

### 3.1 Validity

Validity is a central concept in assessment. In simple terms, it refers to the extent to which an assessment accurately measures what it is supposed to be measuring. Validity also refers to the extent to which the assessment is providing evidence of candidates' achievement levels.

### 3.2 Reliability

Reliability, another crucial concept in assessment, refers to producing reliable, stable and consistent results over time. Ensuring reliability requires clear and consistent processes for the setting, marking and grading of the NCE Assessment.

### 3.3 Impact

The NCE Assessment aims at having positive effects on teaching and learning with positive washback into the curriculum and into the educational system. An important consideration during the development of this assessment was the potential impact that it would have on the life chances of candidates, allowing for maximum inclusion and retention of students in the system while maintaining standards.

### 3.4 Fairness

Needs and characteristics of learners were considered in the design of the NCE Assessment so as not to disadvantage any group or individual. Care has been taken to minimise cultural and gender biases and to accommodate the different abilities and the social, cultural and linguistic backgrounds of candidates.

## 4. Paper Design

Three Assessment Objectives (AOs), defined in the Annual Programme for the National Certificate of Education (NCE) Assessment 2020, underpin the design of the Mathematics paper:

- AO1 - Knowing

Questions assessing knowing evaluate recall and use of facts, concepts, rules and procedures which learners need to solve problems. In general, these require the candidate to carry out standard mathematical procedures. These questions may be with or without a context.

- AO2 - Applying

Questions assessing applying focus on learners' ability to apply their mathematical knowledge and skills to solve routine problems. In these questions, the candidate is required to think of an appropriate method that can be used in a given context.

- AO3-Reasoning

In general, questions assessing reasoning require the candidate to deal with routine and non-routine problems which may be multi-step and may be set in complex contexts. Candidates will be expected to demonstrate their ability to devise strategies to solve mathematical problems. Such strategies may encompass more than one method that will lead to a correct solution. The context of these questions may be unfamiliar to the candidate.

Questions assessing Knowing, Applying and Reasoning may require low, average or high order thinking skills and, thus, can vary in terms of difficulty level.

The skills and competencies which will be assessed under each AO as well as the approximate weighting of the different AOs in the Mathematics paper are detailed in
Table 2.

| ASSESSMENT OBJECTIVES (AOs) |  |  | APPROX. WEIGHTING |
| :---: | :---: | :---: | :---: |
| A01 | Knowing | Candidates should be able to: <br> 1. recall and use specific facts, concepts, rules and formulae; <br> 2. classify numbers, expressions and shapes by common properties; <br> 3. read and interpret simple statements or information; <br> 4. perform simple mathematical operations and routine procedures in varied contexts; <br> 5. retrieve information from graphs, tables, texts or other sources; <br> 6. use measuring instruments and choose appropriate units of measurement; <br> 7. solve simple word problems. | 55\% |
| AO2 | Applying | Candidates should be able to: <br> 1. interpret, use and display data in tables or graphs; <br> 2. form expressions, equations, inequalities to model problem situations; <br> 3. draw geometric figures or diagrams that model problem situations; <br> 4. apply concepts, rules and formulae, appropriate skills, procedures and strategies to solve routine problems. | 35 \% |
| AO3 | Reasoning | Candidates should be able to: <br> 1. analyse and use relationships to solve problems; <br> 2. make sense of multi-faceted information; <br> 3. develop appropriate strategies to solve non-routine problems in varied contexts; <br> 4. demonstrate logical reasoning in solving routine and non-routine problems; <br> 5. interpret information, make inferences and explain their reasoning with clarity; <br> 6. explain whether results make sense in the context of the problems. | 10 \% |

Table 2: Assessment Objectives and their respective weighting in the Mathematics Paper

## 5. Paper Description

The Mathematics paper carries a total of 100 marks and is of a duration of 2 hours.
The paper is graded in terms of difficulty across the paper and within sub-questions. Various types of questions are used in this context including Objective-Type questions such as MCQs, Short-Answer Questions and Structured / Long-Answer Questions.

Around $50 \%$ of the questions are at basic level, $20 \%$ at intermediate level and $30 \%$ at proficient level.

Candidates should attempt all questions.

### 5.1 Types of Questions

### 5.1.1 Multiple-Choice Questions (MCQs)

In the question paper, Multiple-Choice Questions appear as basic level questions consisting of ten items. MCQs may be used to assess any of the AOs defined above. Each MCQ will carry only one mark and four options will be provided with only one correct answer.

### 5.1.2 1-mark Short-Answer Questions

In general, the 1-mark short-answer questions will assess basic concepts and skills of the Mathematics TLS Grades 7 to 9 (MIE, 2017).

### 5.1.3 Short-Answer Questions carrying more than 1 mark

Such questions may comprise one or more parts. Marks will be awarded as follows:

- For questions comprising two or more sub-parts, marks will be awarded for the correct answers, one mark for each part.
- For questions with one part only, 2 or more marks will be awarded for the correct answer. If an incorrect answer is given, intermediate mark(s) may be awarded for a correct method or working shown.


### 5.1.4 Structured / Long-Answer Questions

For such questions, the candidates will have to show how he/she arrived at a solution (working steps) clearly. Omission of essential working may result in loss of marks.

## 6. Some other considerations

It is important to highlight a few other important considerations which guided the development of the NCE Mathematics Specimen Paper. They are:

1. The Mathematics paper will be used to measure achievement of candidates from both the Regular and Extended Programmes. Consequently, the paper should provide candidates of all abilities with a wide range of opportunities to demonstrate what they know and can do in Mathematics.
2. The Mathematics Curriculum is spiral in nature, where learning in one grade builds upon the knowledge, understanding and skills acquired in lower grades.
3. As mentioned earlier, the NCE Assessment will serve different purposes:

- promotion to grade 10 ;
- achievement of Level 2 on the NQF;
- selection for admission to Academies.

These had important implications for the development of the Mathematics Specimen Paper. They implied that, in line with the established grading structure in Table 1, the paper developed should reflect expected outcomes at the end of the NYCBE cycle.

More specifically, to achieve numerical grade 6 or better in the NCE Mathematics Assessment, a candidate needs to score at least 35 marks. However, to achieve these 35 marks and to progress to Grade 10 with confidence, a candidate should be able to demonstrate a minimum level of Knowing, Applying and Reasoning abilities. The paper was developed, therefore, to include accessible, basic tasks under each of the AOs to provide evidence of candidates' acquisition of these competencies.

In parallel, to achieve numerical grade 1 in the NCE Mathematics Assessment, a candidate needs to score at least 85 marks. The paper was also developed, therefore, to provide evidence of the mathematical proficiency attained by high-performing candidates by presenting sufficiently rich and stimulating tasks towards the end of the paper.

With a view to providing a meaningful and positive learning experience to learners, provision has equally been made in the Mathematics paper to:

- include a wide range of different types of questions of varying complexity and requiring different modes of response in the paper.
- minimise the language difficulties which the candidate may encounter. Wherever and whenever possible, the contexts presented or situations given in the paper are described in simple terms.
- encourage the candidate's creativity in solving mathematical problems. Ample working space is given for the candidate to demonstrate his/her mathematical abilities.


## 7. The Blueprint

The Blueprint provided in this document indicates the topics assessed, the learning objectives and the weightings of the Assessment Objectives in the Specimen Paper.

## 8. Bibliography

American Educational Research Association (2014). Standards for educational and psychological testing.

Legal supplement to the Government Gazette of Mauritius No. 120 of 22 December 2018, THE EDUCATION ACT - Regulations made by the Minister under section 38 of the Education Act.

Mauritius Examinations Syndicate (2018). Annual Programme for the National Certificate of Education (NCE) Assessment for 2020

Mauritius Institute of Education (2016). National Curriculum Framework Grades 7, 8 \& 9 .

Mauritius Institute of Education (2019). National Curriculum Framework Syllabus for Grades $7,8 \& 9$.

| NCE Mathematics Specimen Paper Blueprint 2020 |  |  |  |  | Assessment Objectives |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  | AO1-Knowing |  |  | AO2 - Applying |  |  | A03-Reasoning |  | Total |  |
|  |  |  |  |  | Bas - 30 | Int - 10 | Pro-15 | Bas-20 | Int -5 | Pro-10 | Int-5 | Pro-5 |  |  |
| Content Strand | Topic/Sub-topic | Qu. No | Learning Objectives | Textbook | 55 |  |  | 35 |  |  | 10 |  | 100 |  |
| Numbers | Operations | 1 | Perform arithmetic operations | primary level | 1 |  |  |  |  |  |  |  | 1 | 27 |
|  |  | 11(a) | Perform arithmetic operations | primary Level | 1 |  |  |  |  |  |  |  | 1 |  |
|  | Dec/Fractions | 4 | Convert fractions to decimals | Pg 57 (G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  | Fractions | 2 | Add fractions | Pg 48(G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  |  | 11( c) | Demonstrate an understanding of the concept of fractions | Pg 44 (G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  |  | 13 | Subtract fractions | Pg 49 (G7) | 2 |  |  |  |  |  |  |  | 2 |  |
|  | Bodmas | 12 | Perform operations according to BODMAS | Pg 32 (G7) |  |  |  | 1 |  |  |  |  | 1 |  |
|  | Percentage | 8 | Work with percentages | Pg 122 (G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  | Indices | 3 | Recognise and use laws of indices | Pg 134(G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  |  | 14(a) | Use laws of indices | Pg 135(G7) | 2 |  |  |  |  |  |  |  | 2 |  |
|  |  | 14(b) | Solve simple equations involving indices | Pg 11 (9) |  |  |  | 3 |  |  |  |  | 3 |  |
|  | Sequences | 11(j) | Complete number patterns of fibonacci sequence | Pg 211(G9) | 1 |  |  |  |  |  |  |  | 1 |  |
|  |  | 30(i) | Identify and complete a pattern | pg 216(G9) |  |  | 2 |  |  |  |  |  | 2 |  |
|  |  | 30(ii) | Extending a number pattern | pg 216(G9) |  |  |  |  |  | 2 |  |  | 2 |  |
|  |  | 30(iii) | Extending and finding the general term | pg216(G9) |  |  |  |  |  |  |  | 1 | 1 |  |
|  | Ratio | 11(g) | Compare two quantities | Pg 126(G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  |  | 11(f) | Solve word problems involving direct proportions | Pg 131(G7) |  |  |  | 1 |  |  |  |  | 1 |  |
|  | Decimals | 6 | Multiply decimals | Pg 147(G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  | Square Roots | 9 | Find square roots and perfect squares | Pg 27(G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  | Integers | 5 | Perform arithmetic operations on integers | Pg 20 (G7) | 1 |  |  |  |  |  |  |  | 1 |  |
|  |  | 11(e) | Use integers in real life situations | Pg 25 (G7) |  |  |  | 1 |  |  |  |  | 1 |  |
| Geometry | Angles | 18 | Finding unknown angle using the notion of corresponding angles, alternate angles and co-interior angles | Pg 79 (G7) |  |  |  | 2 |  |  |  |  | 2 |  |
|  |  | 11(b) | Identify and name polygon | Pg 233 (G8) | 1 |  |  |  |  |  |  |  | 1 |  |
|  | Polygons | 11(d) | Identify and use complemantary and supplemantary angles | Pg 75(G7) |  |  |  | 1 |  |  |  |  | 1 |  |
|  | Vectors | 21(a) | Express a vector in column form | pg 236(G9) | 2 |  |  |  |  |  |  |  | 2 |  |
|  |  | 21(b) | Finding the magnitude of a vector | Pg236(G9) |  |  |  | 2 |  |  |  |  | 2 | 20 |
|  | Translation | 22 (b) (ii) | Finding the translation vector when image and object are given | pg 240(G9) |  |  | 2 |  |  |  |  |  | 2 |  |
|  | Coordinates | 22(a) | Finding the gradient/equation of line of an inclined line | pg 66 (G9) |  | 3 |  |  |  |  |  |  | 3 |  |
|  | Trigonometry | 27 | Solve trigonometric problems in 2D to find unknown sides | pg 135(G9) |  |  |  |  |  | 4 |  |  | 4 |  |
|  | Reflection | 22(b) (i) | Reflect points | Pg 232 (G7) |  |  | 1 |  |  |  |  |  | 1 |  |
|  | Basic Constructions | 19 | Construct triangles given 3 sides | Pg 262 (G8) |  |  |  | 2 |  |  |  |  | 2 |  |



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Let the mind manage the body Que l'esprit gère le corps

# MATHEMATICS (N 510) 

TIME: 2 HOURS

Additional Material: Geometrical Instruments

## READ THESE INSTRUCTIONS FIRST

1. Write your index number in the space provided above.
2. Write in dark blue or black ink.

You may use an HB pencil for any diagrams. Do not use correction fluid.
3. All answers should be written in the spaces provided in the question paper.

Diagrams are not drawn to scale unless otherwise specified.
3. Answer ALL questions.
4. All necessary workings should be shown in the spaces provided.
5. Check that this assessment paper consists of 31 questions printed on 29 pages from page 2 to page 30.

## 6. ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

7. The total number of marks for this paper is $\mathbf{1 0 0}$.

The number of marks is given in brackets [ ] at the end of each question or part question.

1. Work out

$$
\begin{array}{r}
324 \\
+183
\end{array}
$$

$\qquad$
2. Evaluate $\frac{2}{5}+\frac{1}{5}$

## Answer:

3. Simplify $a^{3} \times a^{4}$
4. Express $\frac{7}{10}$ as a decimal

Answer:
[1]
5. Evaluate 4-7

Answer:
6. Calculate $1.3 \times 4$

Please turn over this page
7. (a) 6 minutes =
seconds
(b) $5700 \mathrm{~m}=$ $\qquad$ km.
8. Evaluate $20 \%$ of 120
9. Find $\sqrt{144}$
10. The pie chart below shows the different sports students like in a class.


Which sport do students like most?

Answer:
11. Circle the letter corresponding to the correct answer in each of the following items.
(a) $1284 \div 6=$

A 212
B 213
C $\quad 214$
D 215
(b) What is the name given to the polygon shown below?


A Hexagon
B Decagon
C Nonagon
D Pentagon
(c) What fraction of the diagram is shaded?


A $\frac{2}{8}$
B $\quad \frac{3}{8}$
C $\quad \frac{4}{8}$
D $\frac{5}{8}$
(d) What is the value of angle $x$ ?


A $40^{\circ}$
B $\quad 50^{\circ}$
C $\quad 130^{\circ}$
D $\quad 140^{\circ}$
(e) Observe the temperatures indicated on the two thermometers below carefully.


Temperature in Port Louis


Temperature in London

What is the difference between the temperatures in Port Louis and London?
A $26^{\circ} \mathrm{C}$
B $\quad 28^{\circ} \mathrm{C}$
C $30^{\circ} \mathrm{C}$
D $32^{\circ} \mathrm{C}$
(f) The cost of 7 pencils is Rs 35 .

What is the cost of 1 pencil?

A Rs 5
B Rs 28
C $\quad$ Rs 42
D Rs 245
(g) What ratio, expressed in its simplest form, represents the number of strawberries to the number of oranges?


A $4: 1$
B 1:4
C $8: 2$
D $2: 8$
(h) Given that matrix $P=\left(\begin{array}{rrr}1 & 5 & 6 \\ -2 & 3 & 0\end{array}\right)$, what is the order of matrix $P$ ?

A $\quad 3 \times 2$
B $\quad 3 \times 3$
C $\quad 2 \times 2$
D $2 \times 3$
(i) Study the Venn diagram below carefully.


What is the value of $n(P \cup Q)$ ?
A 1
B 4
C 5
D 6
(j) Observe the Fibonacci sequence given below.

$$
2, \quad 3, \quad 5, \quad 8, \ldots
$$

What is the next term of the sequence?

A $\quad 10$
B $\quad 11$
C $\quad 12$
D $\quad 13$

12 (a) Evaluate $20-7 \times 2$

Answer
(b) Simplify $3 x+4 x$

## Answer:

13. Calculate $5 \frac{2}{3}-2 \frac{1}{6}$, giving your answer in its simplest form.
14. (a) Evaluate $\left(5^{4}\right)^{\frac{1}{2}}$
(b) Given that $2^{x+1}=32$, find the value of $x$.

Answer: $x=$
15. (a) Solve the inequality $2 x-5<17$.

## Answer:

(b) Hence, write down the greatest possible integer value of $x$.

Answer:
16. Lea travels a distance of 147 kilometres in 3 hours. Find her average speed in kilometres per hour.

## Answer:

km/h [2]
17. Sanju goes to the bank to exchange Rs 1400 into US \$.

How many US \$ does he get, if US \$ $1=$ Rs 35 ?

Answer: US \$
18. Calculate angle $\boldsymbol{x}$.


Answer: $\boldsymbol{x}=$
19. Using a set of compasses, construct triangle $A B C$,
where $A B=10 \mathrm{~cm}, A C=7 \mathrm{~cm}$ and $B C=8 \mathrm{~cm}$.
The line $A B$ has been drawn for you.

A
10 cm
B
20. (a) Factorise $5 x-10$.

## Answer:

[1]
(b) Find the LCM of $2 x^{2} y$ and $4 x y^{2}$.
21. Given $\mathbf{p}=\binom{3}{4}$ and $\mathbf{q}=\binom{-1}{5}$,

Find (a) $2 \mathbf{p}+\mathbf{q}$,

Answer:
(b) $|\mathbf{p}|$.
22. The graph below shows a straight Line L.

(a) (i) Find the gradient of Line $\mathbf{L}$.

Answer:
(ii) Write down the equation of the Line $\mathbf{L}$.
(b) (i) Write down the coordinates of the image of the point $(4,1)$ under a reflection in the $x$-axis.

Answer:
[1]
(ii) Find the translation vector when the point $(3,2)$ is mapped onto $(1,3)$.
23. Given that $y=3 u-v$,
(a) find the value of $y$ when $u=5$ and $v=1$.

Answer:
(b) Express $u$ in terms of $v$ and $y$.
(a) The following numbers represent the marks obtained by six students in a class test.
$\begin{array}{llllll}5 & 3 & 2 & 3 & 8 & 3\end{array}$
(i) Find the mean mark.

Answer:
(ii) Find the mode.

Answer:
(b) The following numbers are arranged in ascending order.
$1,4,6,6, x, 7,7,10$
If the median of the numbers is $6 \frac{1}{2}$, find the value of $x$.
25. (a) The spinner below is rotated once.


Find the probability that the arrow will point to
(i) number 9 ,

Answer:
[1]
(ii) a number greater than 6 .

Answer:
(b) The table below shows the mode of transport used by 10 workers to go to work.

| Mode of Transport | Number of workers |
| :---: | :---: |
| Bus | 5 |
| Motorcycle | 2 |
| Car | 3 |

A worker is chosen at random.
(i) Find the probability that the worker travels by bus.

Answer:
(ii) Hence, draw an arrow on the probability scale to show the probability that the worker chosen travels by bus.

26. Solve the simultaneous equations,

$$
\begin{aligned}
& 2 x+3 y=11 \\
& x-2 y=2
\end{aligned}
$$

Answer: $x=$
$y=$.
27. The diagram below shows a vertical pole PQ. The points $P$ and $R$ are on level ground. $R$ is 25 metres from the foot $P$ of the pole and angle $P R Q=20^{\circ}$.


Using the information given below,
$\left[\sin 20^{\circ}=0.342, \cos 20^{\circ}=0.940, \tan 20^{\circ}=0.364\right]$

Estimate the height of the pole $P Q$, giving your answer to the nearest whole number.

Answer:.
m [4]
28. $\quad \mathbf{A}=\left(\begin{array}{rr}3 & -1 \\ 5 & 2\end{array}\right)$
$B=\left(\begin{array}{ll}2 & 2 \\ 4 & 1\end{array}\right)$
$\mathbf{C}=\left(\begin{array}{cc}3 & -1 \\ 5 & 3-y\end{array}\right)$
(a) If $\mathbf{A}=\mathbf{C}$, find the value of $y$.
(b) Evaluate AB

## Answer:

29. In triangle $A B C, A B=(x+4) c m, A C=(x+2) c m$ and angle $B A C$ is right-angled.

(i) Expand $(x+4)(x+2)$
(ii) The area of triangle ABC is $24 \mathrm{~cm}^{2}$. Use your answer in part (i) to show that $x^{2}+6 x-40=0$.
(iii) Solve the equation $x^{2}+6 x-40=0$ to find the values of $x$. or $x=$
30. Observe the pattern below.

Figure 1
-
Figure 2


Figure 3


Figure 4

(i) Write the sequence for the number of dots in the above figures.

## Answer:

(ii) Write down the next two terms in the sequence obtained in part (i).
(iii) Showing your working clearly, determine which one of the following expressions, (A) or (B), gives the $n^{\text {th }}$ term of the sequence..
(A):

$$
n^{\text {th }} \text { term }=\frac{n(n-1)}{2}
$$

Or
(B):

$$
n^{\text {th }} \operatorname{term}=\frac{n(n+1)}{2}
$$

Answer:
31. (a) Solid metal cylinder A has radius 14 mm and height 50 mm .


Taking $\pi=\frac{22}{7}$, calculate its volume.
(b) An apparatus is made by fixing 2 identical metal cubes to cylinder $\mathbf{A}$ as shown in the diagram below.

The length of each edge of the metal cube is 30 mm .


Calculate the total surface area of the apparatus.
Answer:

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## MARK SCHEME

## MATHEMATICS

Specimen paper Mark scheme for first assessment in October 2020

## The NCE Mathematics Specimen Mark scheme

The Mathematics Specimen Mark Scheme serves to indicate the principles of allocation of marks. It provides the reader with an insight about why, when and how to reward a candidate's achievement in Mathematics.

Any proposed mark scheme is generally not a finalised document and can be adjusted according to candidates' responses.

The methods indicated in the current mark scheme is not exhaustive.

## Generic Marking principles

These Generic Marking principles must be applied by all examiners when marking candidates' answers, alongside the specific content of the mark scheme for each question.

- Marks awarded are always whole marks (Do not award half marks or fractions).
- Marks awarded must be in line with :

1. the specific content of the mark scheme
2. the specific skills defined in the mark scheme
3. the standard of the response required by the candidate

- Marks must be awarded positively as follows

1. Marks are awarded for correct/valid answers as defined in the mark scheme. However credit is given for valid answers which go beyond the scope of the syllabus.
2. Marks are awarded for what candidates know and can do.

- Rules must be applied and instructions followed consistently by markers.


## Important notes about the mark scheme

B marks are independent marks, which do not depend on any other marks. For a B mark to be scored, the point to which it refers must actually be seen in the candidate's answer.

M marks are method marks upon which accuracy marks (A marks) later depend. For an $M$ mark to be scored, the point to which it refers must be seen in a candidate's answer. If a candidate fails to score a particular M mark, then none of the dependent A marks can be scored.

A marks are accuracy or answer marks which either depend on an $M$ mark, or which are one of the ways which allow a C mark to be scored.

C marks are compensatory method marks, which can be scored even if the points to which they refer, are not written down by the candidate, provided subsequent working gives evidence that they must have known it.

## Abbreviations

c.a.o. means "correct answer only"
soi means seen or implied
ecf means error carried forward
oe means " or equivalent"
asc means all signs changed
FT means "Follow through". This indicates that if a candidate has made an earlier mistake and has carried his incorrect value forward to subsequent stages of working, he may be given marks indicated by FT provided his subsequent working is correct, bearing in mind his earlier mistake. This prevents a candidate being penalised more than once for a particular mistake, but only applies to marks annotated "e.c.f."

| Question | Answers | Mark | Remarks |
| :---: | :---: | :---: | :---: |
| 1 | 507 | B1 |  |
| 2 | $\frac{3}{5}$ | B1 |  |
| 3 | $a^{7}$ | B1 |  |
| 4 | 0.7 | B1 | Accept 7 <br> Ignore superfluous zeros |
| 5 | -3 | B1 |  |
| 6 | 5.2 or $5 \frac{1}{5}$ | B1 |  |
| 7(a) | 360 seconds | B1 |  |
| 7 (b) | $5.7 \mathrm{~km} \text { or } 5 \frac{7}{10}$ | B1 |  |
| 8 | 24 | B1 |  |
| 9 | 12 | B1 | Accept $\pm 12$ or -12 |
| 10 | Football | B1 |  |
| 11 (a) | C | B1 |  |
| 11(b) | A | B1 |  |
| 11(c) | B | B1 |  |
| 11(d) | B | B1 |  |
| 11(e) | C | B1 |  |
| 11(f) | A | B1 |  |
| 11(g) | A | B1 |  |
| 11(h) | D | B1 |  |
| 11(i) | B | B1 |  |
| 11(j) | D | B1 |  |


| 12(a) | 6 | B1 |  |
| :---: | :---: | :---: | :--- |
| 12(b) | B1 |  |  |
| 13 | $3 \frac{1}{2}$ or 3.5 or $\frac{7}{2}$ | B2 | After B0, B1 for $\frac{17}{3}-\frac{13}{6}$ seen |
| or |  |  |  |


| 16 | 49 | B2 | After B0 <br> M1 for $\frac{147}{3}$ seen |
| :---: | :---: | :---: | :--- |
| 17 | 40 | B2 | After B0 <br> M1 for $\frac{1400}{35}$ oe |
| 18 | $80^{0}$ | B2 | After B0 <br> B1 for $30^{0}+50^{0}$ seen |
| 19 | The two lines drawn correctly. <br> Accept $\pm 1 m m$ for length |  |  |
| 20 (a) | B2 | After B0, M1 for one line drawn <br> correctly |  |
| (b) |  | B1 for $130^{\circ}$ or $150^{\circ}$ seen |  |


| 22(a) (i) | 3 | B2 | After B0, <br> M1 for either using the formula $\frac{y_{2}-y_{1}}{x_{2}-x_{1}} / \frac{y_{1}-y_{2}}{x_{1}-x_{2}}$ <br> or <br> for using $\frac{\text { change in } y \text { values }}{\text { change in } x \text { values }}$ directly from the graph |
| :---: | :---: | :---: | :---: |
| 22(a)(ii) | $y=3 x+2$ | B1 |  |
| 22 (b) (i) | $(4,-1)$ | B1 |  |
| 22(b) (ii) | $\binom{-2}{1}$ | B2 | After B0, <br> B1 for one correct component B1 for $\begin{gathered}\text { or } \\ 1\end{gathered}$ or $(-2,1)$ or $\left(\frac{-2}{1}\right)$ |
| 23(a) | 14 | B2 | After B0, <br> B1 for 3(5) - 1 <br> or <br> B1 for 15-1 <br> or <br> B1 for (their 15) -1 correctly evaluated |
| 23(b) | $u=\frac{y+v}{3}$ or equivalent | B2 | After $\mathrm{B} 0, \mathrm{M} 1$ for $3 u=y+v$ asc |
| 24 (a) (i) | 4 | B2 | After B0 <br> M1 for $\frac{5+3+2+3+8+3}{6}$ |
| 24 (a) (ii) | 3 | B1 |  |


| 24(b) | B | B2 | After B0, <br> M1 for $\frac{x+6}{2}=6 \frac{1}{2}$ |
| :---: | :---: | :---: | :---: |
| or |  |  |  |


|  |  | B1 | B1 for 9 FT from (their 9.1) |
| :---: | :---: | :---: | :---: |
| 28(a) | 1 | B2 | $\mathrm{B} 0, \mathrm{M} 1$ for $3-y=2$ |
| 28(b) | $\left(\begin{array}{cc} 2 & 5 \\ 18 & 12 \end{array}\right)$ | B3 | B2 for any three correct entries B1 for any two correct entries |
| 29 (i) | $x^{2}+6 x+8$ | B2 | After B0, <br> M1 for any two correct terms in a three term expression <br> or <br> M1 for $x^{2}+2 x$ <br> or <br> M1 for $4 x+8$ |
| 29 (ii) | $\begin{gathered} x^{2}+6 x-40=0 \text { correctly } \\ \text { found } \end{gathered}$ | B2 | After BO, <br> M1 for $\frac{1}{2}(x+4)(x+2)=24$ oe |
| 29(iii) | $\left.\begin{array}{c} (x+10)(x-4) \\ \text { or } \\ (x-10)(x+4) \end{array}\right]$ | M1 <br> A1 <br> A1 |  |
| 30(i) | 1,3,6,10 | A2 | After A0, B1 for any three correct answers and in correct order |
| 30(ii) |  | $\begin{aligned} & \mathrm{B} 1 \\ & \mathrm{~B} 1 \end{aligned}$ |  |

\(\left.$$
\begin{array}{|c|c|c|l|}\hline \text { 30(iii) } & \text { B correctly shown } & \text { B1 } & \\
\hline 31 \text { (a) } & 30800 & \text { B2 } & \begin{array}{l}\text { After B0 } \\
\text { M1 for calculating volume of } \\
\text { cylinder that is } \\
\frac{22}{7} \times 14 \times 14 \times 50\end{array} \\
\hline 31 \text { (b) } & 13968 & \text { B1 } & \begin{array}{l}\text { B1 for calculating area if square : } \\
30 \times 30 \text { oe }\end{array}
$$ <br>
B1 for calculating area of circle: <br>
\frac{22}{7} \times 14 \times 14 oe <br>
B1 for calculating curved surface <br>

area: 2 \times \frac{22}{7} \times 14 \times 50\end{array}\right]\)| B1 for $10(30 \times 30)$ or 12 (30 $\times 30)$ |
| :--- |
| or $2\left(\frac{22}{7} \times 14 \times 14\right)$ seen |
| M1 for |
| $10 \times$ their $(30 \times 30)$ |
| M1 |

