

HARRISON COLLEGE
THIRD FORM MATHEMATICS
END OF YEAR ASSESSMENT 2021

DURATION: 1-Hour

GENERAL INSTRUCTIONS TO CANDIDATES

- 1) This Examination Paper consists of **TWO SECTIONS, I and II**, and **NINE** printed pages and **ONE** blank page for additional working or rough work.
- 2) Answer **ALL** Questions in **BOTH SECTIONS**.
- 3) Calculators are **ALLOWED**.
- 4) The maximum mark for this Assessment is **56**.
- 5) Write your **NAME** and **FORM** below.

NAME OF STUDENT: _____

FORM: _____

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

LIST OF FORMULAE

Volume of Prism

$V = Ah$ where A is the area of a cross-section and h is the perpendicular length.

Volume of Cylinder

$V = \pi r^2 h$ where r is the radius of the base and h is the perpendicular height.

Volume of a right pyramid

$V = \frac{1}{3} Ah$ where A is the area of the base and h is the perpendicular height.

Circumference

$C = 2\pi r$ where r is the radius of the circle.

Arc length

$S = \frac{\theta}{360} \times 2\pi r$ where θ is the angle subtended by the arc, measured in degrees.

Area of a circle

$A = \pi r^2$ where r is the radius of the circle.

Area of a sector

$A = \frac{\theta}{360} \times \pi r^2$ where θ is the angle of the sector, measured in degrees.

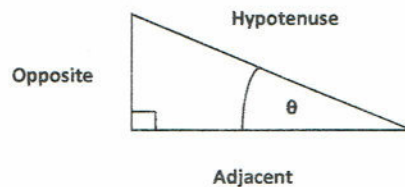
Area of Trapezium

$A = \frac{1}{2}(a + b)h$ where a and b are the lengths of the parallel sides and h is the perpendicular distance between the parallel sides.

Trigonometric ratios

$$\sin \theta = \frac{\textit{opposite side}}{\textit{hypotenuse}}$$

$$\cos \theta = \frac{\textit{adjacent side}}{\textit{hypotenuse}}$$

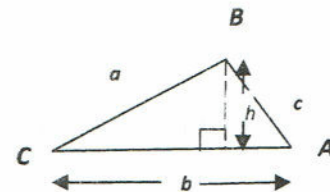
$$\tan \theta = \frac{\textit{opposite side}}{\textit{adjacent side}}$$


Area of a triangle

Area of $\Delta = \frac{1}{2}bh$ where b is the length of the base and h is the perpendicular height.

Area of $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

where $s = \frac{a+b+c}{2}$



SECTION I

CIRCLE the **LETTER** that matches your response for Questions 1) to 14).

1) The number 374.438 written correct to 1 decimal place is

- A) 374.0 B) 374.4 C) 374.5 D) 375.4

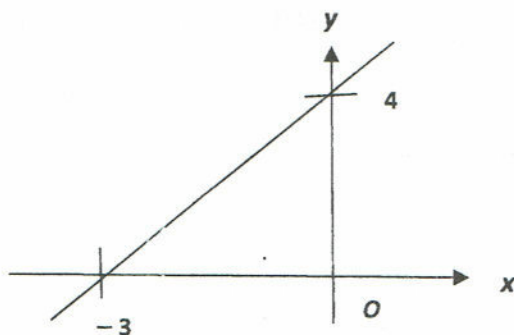
2) The value of $\frac{(4a)^3}{6a^2-2a^2}$

- A) $16a$ B) $2a^2$ C) $4a$ D) a^3

3) If $x * y$ is defined to be $x \div \frac{2}{y}$, then $-2 * p$

- (A) p (B) $-\frac{p}{4}$ (C) $-\frac{4}{p}$ (D) $-p$

4)



The diagram above, not drawn to scale, illustrates the graph of

- (A) $y = -3x + 4$ (B) $y = 4x - 3$ (C) $y = \frac{4}{3}x + 4$ (D) $y = \frac{3}{4}x - 4$

5) The gradient of the line perpendicular to $3x - 2y = 1$ is

- (A) $\frac{2}{3}$ (B) $\frac{3}{2}$ (C) $-\frac{3}{2}$ (D) $-\frac{2}{3}$

6) The equation of the line which passes through the point (1, 2) and is parallel to the line with equation $y = 3x + 2$ is

- A) $y = 3x - 1$ B) $y = 3x + 2$ C) $y = \frac{1}{3}x + 2$ D) $y = \frac{1}{3}x - 1$

7) Three times the difference of two numbers, a and b , may be written as

- A) $3a - b$ B) $3a - 3b$ C) $3a + 3b$ D) $3a \times 3b$

8) If $4(1-x) - 2x = 3$, then $x =$

A) $\frac{3}{4}$

B) $-\frac{7}{6}$

C) $\frac{1}{2}$

D) $\frac{1}{6}$

9) $\frac{1-3x}{2} - \frac{x+1}{4}$ simplifies to

A) $\frac{1-7x}{4}$

B) $\frac{3-5x}{4}$

C) $\frac{2-3x}{4}$

D) $6 - 14x$

10) If $\frac{2}{a-b} = \frac{1}{4}$, then the value of $\frac{3a-3b}{2}$ is

(A) $\frac{8}{3}$

(B) $\frac{3}{2}$

(C) 8

(D) 12

11) A number, $4n$, is squared, then decrease by $\frac{1}{3}$, algebraically, this may be represented as

(A) $4n^2 - \frac{1}{3}$

(B) $16n^2 - \frac{1}{3}$

(C) $(4n^2 - \frac{1}{3})^2$

(D) $16n^2 + \frac{1}{3}$

12) If $\frac{3}{p} - \frac{2}{q} = r$, then p equals

(A) $\frac{3q}{2+qr}$

(B) $\frac{3q-r}{2}$

(C) $\frac{3}{2+r}$

(D) $3q - 2r$

Questions 13) and 14) refer to the data below which represent the length, to the nearest cm, of a sample of rulers.

25, 20, 15, 42, 25, 25, 30, 42

13) The modal length of the rulers is

(A) 42

(B) 30

(C) 25

(D) 15

14) The median length of the rulers is

(A) 20

(B) 25

(C) 30

(D) 42

[14]

SECTION II

ALL WORKING MUST BE CLEARLY SHOWN FOR QUESTIONS 15 to 20 IN THE SPACE PROVIDED AFTER EACH QUESTION

- a) Number your responses **carefully** and **identically** (including any associated parts) as they appear in this section of the question paper.
- b) If a numerical answer cannot be given **exactly**, and the accuracy required is not specified in the question, then in the case of an angle it **must** be given correct to **one (1)** decimal place, in other cases it **must** be given correct to **three (3) significant figures**.

15) Simplify fully $\left(c^{-\frac{2}{5}}\right)^3 \times \frac{1}{c^2}$

[3]

16) m is directly proportional to the square root of n cubed.

(i) Write an equation involving m and n .

[3]

(ii) Given that $m = 6$ when $n = 4$, calculate the value of m when $n = 9$.

[4]

17) Solve for x and y , the simultaneous equations:

$$\begin{aligned}3x - \frac{1}{2}y &= 5 \\2x + 3y &= 20\end{aligned}$$

[4]

18) \$ 10 000 in savings bonds are invested for 3 years at an initial rate of 2 % per annum.

(i) Calculate the value of the investment after one year. [2]

For the next 2 years the bonds are not cashed in, and an additional 1% interest is added annually

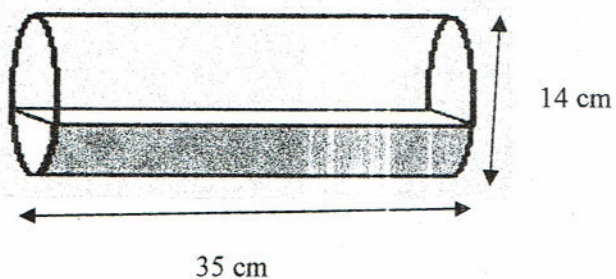
(ii) Calculate the amount of interest received at the end of the investment period. [5]

- 19) The table below shows the time spent, to the nearest minute, by 25 students at the school canteen.

Time spent at the canteen (minutes)	Frequency
6 – 10	2
11 – 15	4
16 – 20	8
21 – 25	(i)
26 – 30	4
31 – 35	1

- (i) Complete the row numbered (i) [1]
(ii) State the modal class [1]
(iii) Calculate the mean time spent at the canteen [8]
(iv) Determine the probability that a student chosen at random spent no more than 20 minutes at the canteen. [1]

- 20) The figure below, not drawn to scale, shows a cylinder one-third filled with liquid. The diameter of the cylinder is 14 cm and its length is 35 cm.



Using $\pi = \frac{22}{7}$, calculate the **EXACT** value of

- (i) the remaining capacity of the cylinder [2]
- (ii) the amount of liquid that must be removed so that the cylinder is one-quarter filled [5]
- (iii) the total surface area of the cylinder [3]

End of Assessment