East Doncaster Secondary College

Year 9 ALPHA Mathematics

Semester 1 Exam, 2022

Name: _____

Teacher (Circle): RAB XUE

Date: _____

Reading Time: 10 Minutes

Writing Time: 90 Minutes

Section	Type	Questions	Total Marks for Section
A	Multiple Choice	10	10
B	Short Answer	13	45
C	Extended Response	1	5
			60

Information:

- Students **are not permitted** to bring mobile phones and/or any other unauthorised electronic devices into the examination room
- Students **are permitted** to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers and one bound reference book.
- Students **are not permitted** to bring into the examination room: blank sheets of paper and/or white out liquid/tape.
- A **scientific calculator** is allowed in this exam
- EAL students are allowed to bring into the examination room a hard copy dictionary; electronic dictionaries are **NOT** allowed.
- Express answers to 2 decimal places where necessary unless instructed otherwise.
- **Please fill in the boxes at the bottom of Page 2 to answer the Multiple-Choice Section**

Section A – Multiple Choice

Question 1

The gradient of the line which passes through the points $(1,8)$ and $(3,-6)$ is

A. 7

B. -7

C. $\frac{7}{2}$

D. $\frac{-7}{2}$

Question 2

Which of the following has a solution of $x = -5$?

A. $3x - 7 = 8$

B. $\frac{2x+3}{13} = 1$

C. $\frac{12}{x} = -2.4$

D. $\frac{3}{2-x} = 1$

Question 3

The pair of linear equations, $y = x + 3$ and $y = -2x + 6$, intersect at the point

A. $(-3,0)$

B. $(3,6)$

C. $(1,4)$

D. $(-1,8)$

Question 4

Which of the following is irrational

A. $2\sqrt{5}$

B. $\sqrt[3]{64}$

C. $\sqrt[5]{32}$

D. $2\sqrt{100}$

Question 5

Which of the following is not equivalent to $\sqrt{48}$

A. $2\sqrt{12}$

B. $\sqrt{8} \times \sqrt{6}$

C. $4\sqrt{3}$

D. $2\sqrt{6} \times 2\sqrt{2}$

Question 6

What is the factorised form of $3(a-2) - b(a-2)$

A. $(a-2)(3-b)$

B. $(a-2)(b-3)$

C. $(a-2)(3+b)$

D. $(a+2)(3+b)$

Question 7

The solutions to $x^2 - 18 = 0$ are:

A. $x = -3\sqrt{2}, 3\sqrt{2}$

B. $x = -4\sqrt{2}, 4\sqrt{2}$

C. $x = -2\sqrt{3}, 2\sqrt{3}$

D. $x = -18, 18$

Question 8

The turning point form of the expression, $x^2 + 6x - 7$ is:

A. $(x+3)^2 - 16$

B. $(x-3)^2 - 16$

C. $(x+3)^2 + 16$

D. $(x-3)^2 + 16$

Question 9

The exact area of the slanted *surface* of a cone with radius 2 cm and slant height 6 cm is:

A. $12\pi\ cm^2$

B. $18\pi\ cm^2$

C. $3\pi\ cm^2$

D. $6\pi\ cm^2$

Question 10

A sphere has a volume equal to its surface area (in value). The radius of the sphere is:

A. 1 unit

B. 2 units

C. π units

D. 3 units

Question	1	2	3	4	5	6	7	8	9	10
Response										

Section B – Short Answer

Question 1 *(2 + 2 = 4 Marks)*

Solve each of the following for x

a) $3x + 5 = 5x + 11$

b) $\frac{x-3}{3} = \frac{5-x}{4}$

Question 2 *(2 + 3 = 5 Marks)*

Solve each of the following inequalities for x

a) $3 - \frac{5x}{7} \leq -2$

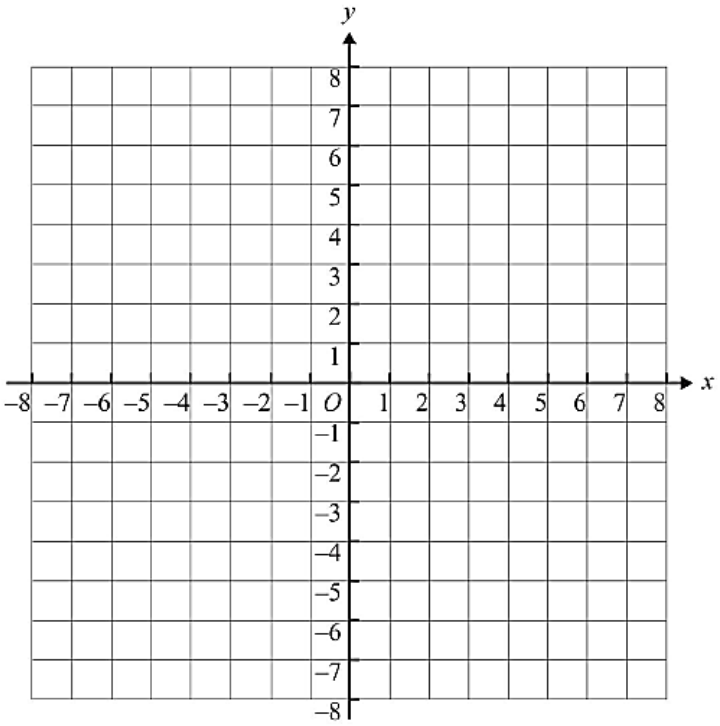
b) $\frac{5x-6}{3} - \frac{1-2x}{4} \geq 3x + 4$

Question 3 *(2 Marks)*

Find the exact distance between the pair of points (–2, 4) and (–7, –4).

Question 4 *(2 + 2 + 2 = 6 Marks)*

a) Sketch the graph of $y = -2x - 3$, labelling all axes intercepts as coordinates



b) State the equation of the line perpendicular to $y = -2x - 3$, which passes through $(-\frac{3}{2}, 6)$

c) Show that the graph, $3y + 6x = -7$ would have no intersections with the graph in part **a)**.

Question 5 *(2 Marks)*

Calculate the midpoint of the line segment joining the points (–3, 1) and (5, 3)

Question 6 *(3 Marks)*

Solve the following pair of simultaneous equations

$$6y + 3x = -9$$
$$5x - 3y = 11$$

Question 7 *(1 + 2 = 3 Marks)*

Factorise each of the following

a) $x^2 + 2x - 63$

b) $2x^2 + 7x + 3$

Question 8 *(2 Marks)*

Simplify the following expression

$$\frac{x^2 - 8x - 20}{x^2 + 10x + 21} \div \frac{x^2 - 100}{x^2 - 3x - 18}$$

Question 9 *(3 Marks)*

Using the method of 'Completing the Square', to solve for the values of 'x'

$$2x^2 + 12x - 1 = 0$$

Question 10 *(2 Marks)*

Solve the following using the quadratic formula

$$4x^2 - 12x + 1 = 0$$

Question 11 *(2 Marks)*

Show that $4x^2 + kx + 1 = 0$, has only one solution, when $k = \pm 4$

Question 12 *(3 + 3 = 6 Marks)*

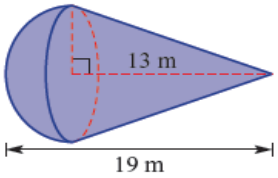
Simplify each of the following using positive indices

a) $\frac{15x^2y^4}{2xy} \div \frac{(5xy^3)^2}{4(xy)^{-1}}$

b) $(8x^6y)^{\frac{1}{3}} \times 9x^{\frac{1}{5}}y^{\frac{2}{3}}$

Question 13 *(1 +1 + 3 = 4 Marks)*

This composite 3D solid comprises of a hemisphere and a cone, as shown.



Leave all answers in exact form unless told otherwise.

a) Determine the radius of the hemisphere

b) Calculate the exact slant height of the cone.

c) Calculate the total surface area of this object. Express your answer in exact value.

Section C - Extended Response

Question 1 *(2 + 3 = 5 Marks)*

A cylinder has a radius of $\left(\frac{1}{\sqrt{2}-1}\right) cm$ and a height of $\left(\sqrt{2}+1\right)cm$

a) Show that the volume of this cylinder can be expressed as $\left(\frac{\pi(\sqrt{2}+1)}{3-2\sqrt{2}}\right)$ cm^3

b) Hence or otherwise, show that the volume of the cylinder, $\left(\frac{\pi(\sqrt{2}+1)}{3-2\sqrt{2}}\right)$ is exactly $\pi\left(7+5\sqrt{2}\right)cm^3$

END OF EXAMINATION