HORNSBY GIRLS HIGH SCHOOL

Mathematics Extension 1

Year 11
Assessment 2 Term 2 2020

STUDENT NUMBER: _____

General Instructions

- Reading Time – 5 minutes
- Working Time – 60 minutes
- Write using black or blue pen
  Black pen is preferred
- NESA-approved calculators may be used
- In Questions 6 – 8, show relevant mathematical reasoning and/or calculations
- Marks may be deducted for untidy and poorly arranged work
- Do not use correction fluid or tape
- Do not remove this paper from the examination

Total marks – 35

Section I Pages 3 – 5

5 marks

Attempt Questions 1 – 5

Answer on the Objective Response Answer Sheet provided

Section II Pages 6 – 8

30 marks

Attempt Questions 6 – 8.

Question	***1-5***	***6***	***7***	***8***	***Total***
Total	*/5*	*/10*	*/10*	*/10*	*/35*

This assessment task constitutes 30% of the Preliminary Higher School Certificate Course School Assessment

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Section I

5 marks
Attempt Questions 1 – 5
Allow about 10 minutes for this section

Use the Objective Response answer sheet for Questions 1 – 5

Q1. Evaluate, $\sqrt{\dfrac{3.079^4}{2516-41.35^2}}$, expressing your answer in scientific notation correct to 3 significant figures.

(A) 0.333×10^{-1}

(B) 3.34×10

(C) 3.34×10^{-1}

(D) 3.34×10^{-2}

Q2. Using *t* formulae, where $t = \tan\dfrac{\theta}{2}$, express $\sec\theta+\tan\theta$ in terms of *t*.

(A) $\dfrac{1-t}{1+t}$

(B) $\dfrac{1+t}{1-t}$

(C) $\dfrac{1-2t}{1-t^2}$

(D) $\dfrac{1+t^2}{1-2t}$

Q3. For the function $f(x)=\dfrac{x-1}{x+2}$, find an expression for $f^{-1}(x)$.

(A) $f^{-1}(x)=\dfrac{1+2x}{x-1}$

(B) $f^{-1}(x)=\dfrac{2+x}{x-1}$

(C) $f^{-1}(x)=\dfrac{1+2x}{1-x}$

(D) $f^{-1}(x)=\dfrac{1-2x}{x+1}$

Q4. What is the range of the function $y=\dfrac{2}{x^2-4}$?

(A) $\left(-\infty,-\dfrac{1}{4}\right)\cup(0,\infty)$

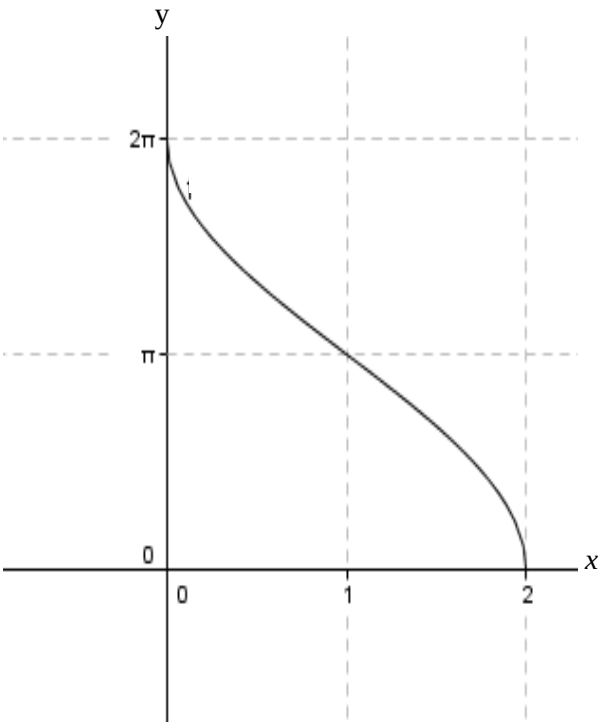
(B) $\left(-\infty,-\dfrac{1}{4}\right]\cup(0,\infty)$

(C) $\left(-\infty,-\dfrac{1}{2}\right)\cup(0,\infty)$

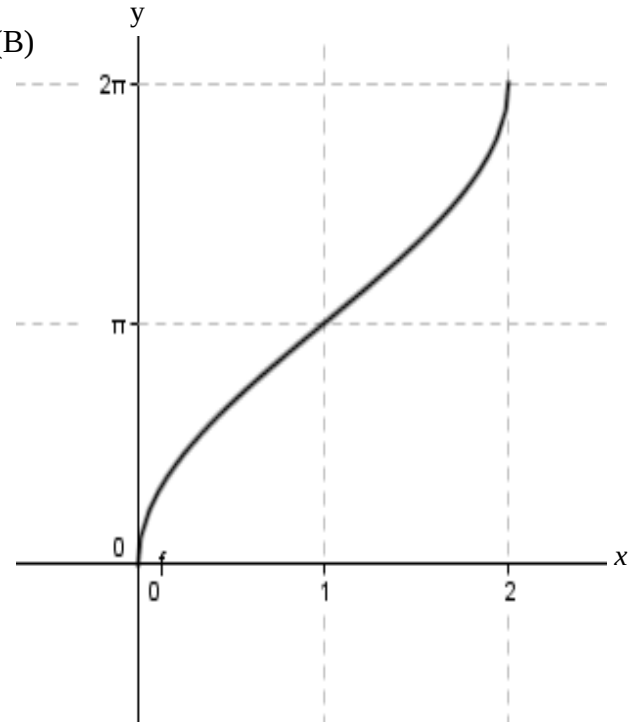
(D) $\left(-\infty,-\dfrac{1}{2}\right]\cup(0,\infty)$

Q5. Which of the following graphs represents the function $y = 2\sin^{-1}(1-x)+\pi$?

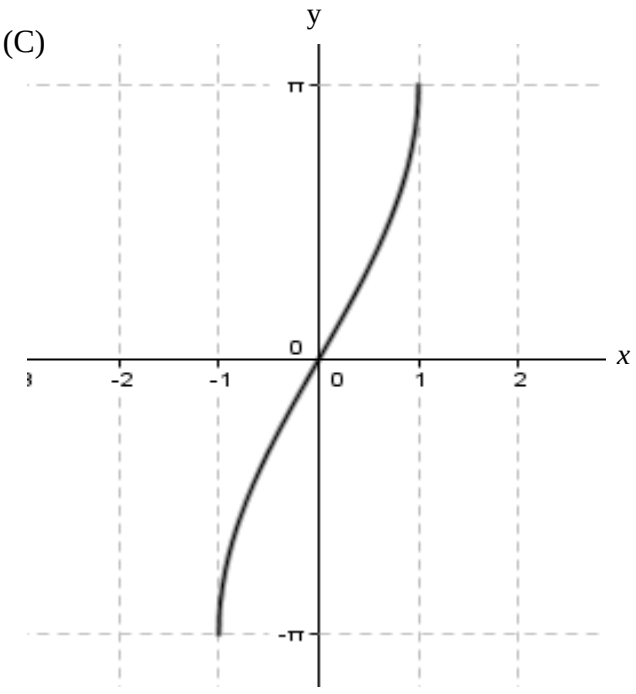
(A)



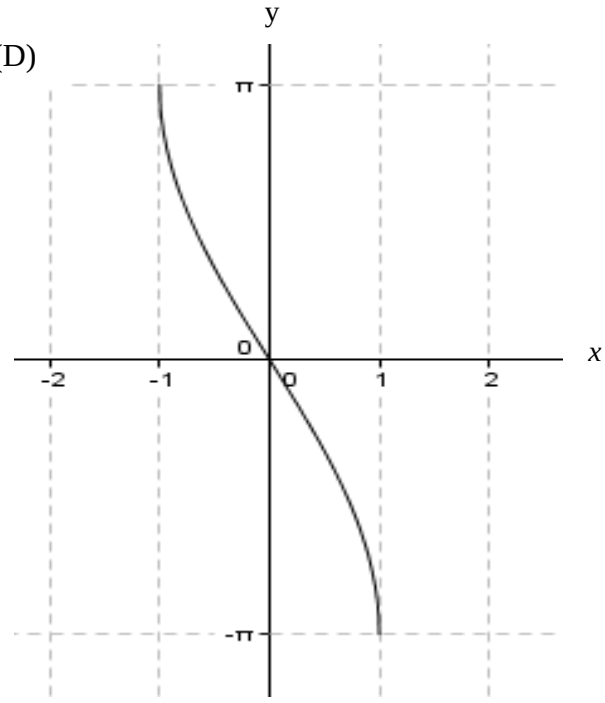
(B)



(C)



(D)



End of Section I

Section II

30 marks
Attempt Questions 6-8
Allow about 50 minutes for this section

Question 6 (10 marks)

(a) (i) Write down the expansion for $\tan(A-B)$ **1**

(ii) Hence, or otherwise, find the exact value of $\tan\frac{\pi}{12}$. Express your answer with a rational denominator. **2**

(b) Find the exact value of $\sin\left(2\tan^{-1}(\frac{3}{4})\right)$ **2**

(c) (i) Sketch $y=|x+3|$ and $y=-x+1$ on the same number plane. **2**

(ii) Hence, or otherwise, solve $|x+3|+x-1<0$ **1**

(d) Solve for x: $(1-x)^2<\frac{9}{25}$ **2**

Question 7 (10 marks) START A NEW PAGE

(a) What is the Cartesian equation of the parametric equations below? **2**

$$x = 4 + 3\cos\theta \text{ and } y = 3\sin\theta - 5$$

(b) (i) Prove that $\dfrac{\sin 2x}{1+\cos 2x} = \tan x$. **2**

(ii) Hence, or otherwise, find the exact value of $\tan 22.5°$ in simplest surd form. **2**

(c) (i) Show that the equation $\tan 2x = 5\sin 2x$ **2**

can be written in the form $\sin 2x(1 - 5\cos 2x) = 0$

(ii) Hence solve, for $0° \le x \le 180°$, $\tan 2x = 5\sin 2x$ **2**

Express your answers correct to the nearest degree, where appropriate.

Question 8 (10 marks) START A NEW PAGE

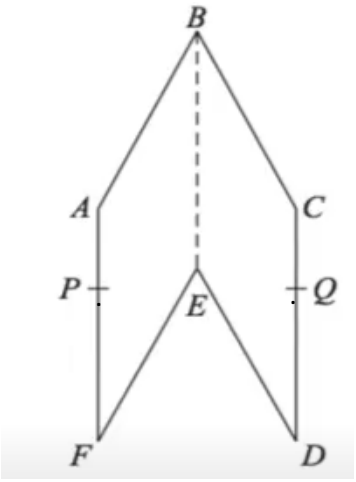
(a) Solve for x: $\dfrac{x+2}{x(x-1)} \geq 0$. **3**

(b) Solve for x and y: **3**

$$x^2 - 4y^2 = 9$$
$$3x + 4y = 7$$

(c) The diagram below shows a hexagon $ABCDEF$.

$ABEF$ and $CBED$ are congruent parallelograms where $AB = BC = x$ cm. P is a point on AF and Q is point on CD such that $BP = BQ = 10$ cm. $\angle ABC = 30°$



NOT TO SCALE

(i) Show that $AC^2 = x^2(2-\sqrt{3})$ **2**

(ii) Show that $\angle PBQ = \cos^{-1}\left(1 - \dfrac{x^2(2-\sqrt{3})}{200}\right)$ **2**

End of paper

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Section I – Multiple Choice Answer Sheet

Allow about 10 minutes for this section

Select the alternative A, B, C or D that best answers the question. Fill in the response oval completely.

Sample: 2 + 4 = (A) 2 (B) 6 (C) 8 (D) 9

A ○ B ● C ○ D ○

If you think you have made a mistake, put a cross through the incorrect answer and fill in the new answer.

A ● B ⊗ C ○ D ○

If you change your mind and have crossed out what you consider to be the correct answer, then indicate the correct answer by writing the word **correct** and drawing an arrow as follows.

A ⊗ B ⊗ ← correct C ○ D ○

1. A ○ B ○ C ○ D ○
2. A ○ B ○ C ○ D ○
3. A ○ B ○ C ○ D ○
4. A ○ B ○ C ○ D ○
5. A ○ B ○ C ○ D ○