Pre-Calculus 12
Resource Exam A
Exam Booklet I

Multiple-Choice and Written-Response Questions
Calculator Permitted

Instructions

1. When answering questions in Booklet I:

   • calculators are permitted for the first 45 minutes.

   • you will be able to continue in Booklet I after 45 minutes, but without the use of a calculator.

2. When using a calculator:

   • round final answers with decimals to at least two decimal places unless otherwise indicated in the question.

3. Once the calculator is put away, Booklet II will be handed out.

4. Diagrams are not necessarily drawn to scale.

5. You may use the provided Formula Page for reference.

MULTIPLE-CHOICE QUESTIONS
**(Calculator permitted)**

Value: 21 marks

INSTRUCTIONS: For each question, select the **best** answer.

You have a maximum of 45 minutes to work with your calculator. After 45 minutes you will be allowed to continue in Booklet I but without the use of a calculator.

Note: some of the written-response questions in the Written-Response section may require the use of a calculator and should be completed within the first 45 minutes.

1. Determine the smallest zero for $y = 4\sin 3\theta + 2$ in the interval $2\pi \le \theta \le 3\pi$.

   A. 0.38
   B. 1.22
   C. 6.66
   D. 7.50

2. In high school, a shot put is thrown out of a circle with a radius of 3.5 feet. A curved wooden "stopboard" is placed in an arc around part of this circle. The central angle is 65.5 Determine the length of the curved "stopboard."

stopboard

65.5°
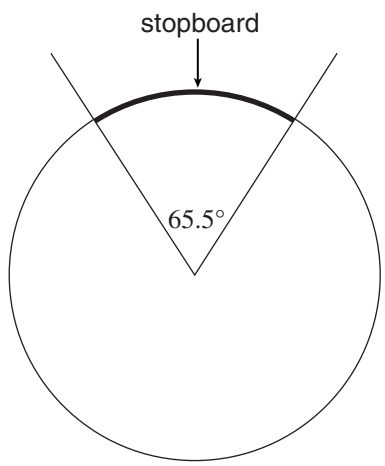
A. 3.5 feet
B. 4.0 feet
C. 4.5 feet
D. 5.0 feet

3. On Oct. 2, 2010, the tide at New Westminster reached a maximum height of 10.8 feet at midnight. At 9 am the tide reached the next minimum height of 5.8 feet. Assuming the relationship is sinusoidal, what was the height of the tide at 7 am?

A. 6.1 feet
B. 6.4 feet
C. 8.7 feet
D. 9.9 feet

4. Solve: $7 = 2^{x+1}$

A. −0.64
B. 1.36
C. 1.81
D. 3.81

5. The population in a particular community is increasing at an annual rate of 6.5%. Assume this trend will continue. In how many years will the present population of 12 000 grow to 32 000?

   A. 15.5
   B. 15.6
   C. 15.8
   D. 16.1

6. In a study which compared the pH of urine and tears, the following data was collected.

	Urine	Tears
Joe	6.2	7.6
Bob	6.3	7.4
Bill	5.5	7.5
Average	**6.0**	**7.5**

On average, how many times more alkaline are tears than urine?

   A. 1.3
   B. 1.5
   C. 15.0
   D. 31.6

☞ Students should notice that information regarding the pH scale will appear on the formula sheet and not within individual questions.

7. A restaurant offers a selection of 4 different sandwiches, 3 different soups and 4 differe[nt] flavours of juice. In how many different ways can a person select one item from each cate[gory]

    A. 11
    B. 18
    C. 48
    D. 54

8. Determine the 4th term in the expansion of $\left(4x - \dfrac{y}{2}\right)^8$.

    A. $-7168x^5y^3$
    B. $-128x^5y^3$
    C. $16x^4y^4$
    D. $1120x^4y^4$

9. A family of 6 (2 parents and 4 children) sit in a row at a theatre. A parent must sit at either end with the 4 children between them. In how many ways can the family be seated?

    A. 24
    B. 48
    C. 120
    D. 720

10. From a standard deck of 52 cards, how many 5-card hands can be formed containing at least 4 clubs?

    A. 20 592
    B. 27 885
    C. 29 172
    D. 34 320

11. A hockey team has played 10 games and has a record of 5 wins, 3 losses and 2 ties. In how many ways could this have happened if after the first 4 games the team's record was 3 wins and a loss?

    A.   90
    B.   94
    C. 360
    D. 630

12. When a polynomial $P(x)$ is divided by $x+3$, the remainder is 2. Which point must be on the graph of the corresponding function $y = P(x)$.

    A. $(-3,\ -2)$
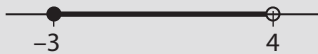   B. $(-3,\ 0)$
    C. $(-3,\ 2)$
    D. $(3,\ 2)$

13. Determine the range of the rational function graphed below.
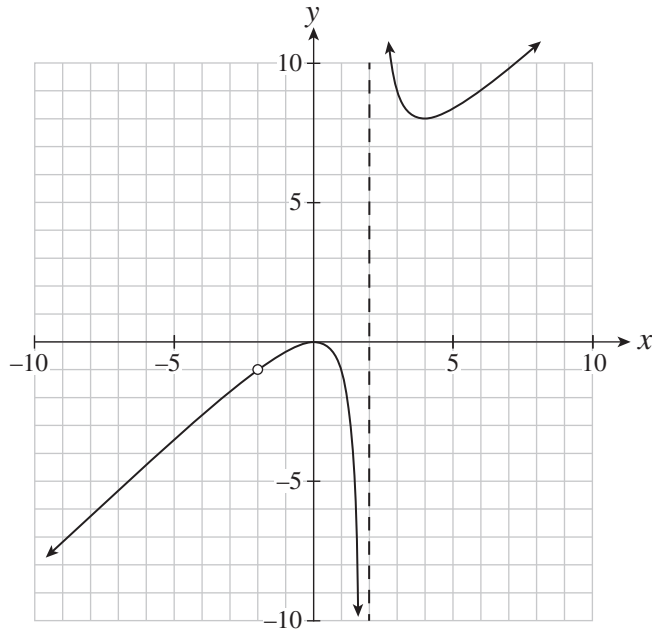
A. all reals
B. $(-\infty, \ 0], [8, \ \infty)$
C. $(-\infty, \ 2), (2, \ \infty)$
D. $(-\infty, \ -1), (-1, \ 0), [8, \ \infty)$

☞ Students are expected to be familiar with describing intervals in a variety of ways.
For example, the interval notation $[-3, \ 4)$ is equivalent to $-3 \le x < 4$ as well as

-3   4

14. The graph of $y = f(x)$ is stretched horizontally by a factor of $\frac{1}{4}$. Determine the eq... transformed graph.

A. $y = \frac{1}{4}f(x)$

B. $y = 4f(x)$

C. $y = f\left(\frac{1}{4}x\right)$

D. $y = f(4x)$

☞ Expansions and compressions will both be referred to as "stretches." The questions will read "stretched by a factor of 3" for **expansions** and "stretched by a factor of $\frac{1}{3}$" for **compressions**.

This is the end of the Multiple-Choice section.
Answer the remaining questions directly in the Written-Response section.

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WRITTEN-RESPONSE QUESTIONS
(Calculator permitted)

Value: 16 marks

INSTRUCTIONS: Answer the following questions in the space provided.

Any questions with a ▦ symbol should be attempted within the first 45 minutes while you have access to a calculator. After 45 minutes you will be allowed to work on this section but without the use of a calculator.

Rough-work space has been incorporated into the space allowed for answering each question. You may not need all the space provided to answer each question.

When using the calculator, you should provide a decimal answer that is **accurate to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

When asked to provide explanations, you are encouraged to use sketches, diagrams or examples to support your work. You will be evaluated on the concepts expressed, the organization and accuracy of your work, and your use of language.

Full marks will NOT be given for a final answer only.

1. Solve algebraically, over the set of real numbers, giving exact values where possible.

$$3\sin^2\theta + 5\cos\theta = 1$$

☞ "Solve over the set of real numbers" is equivalent to saying "Find the general solution in radians."

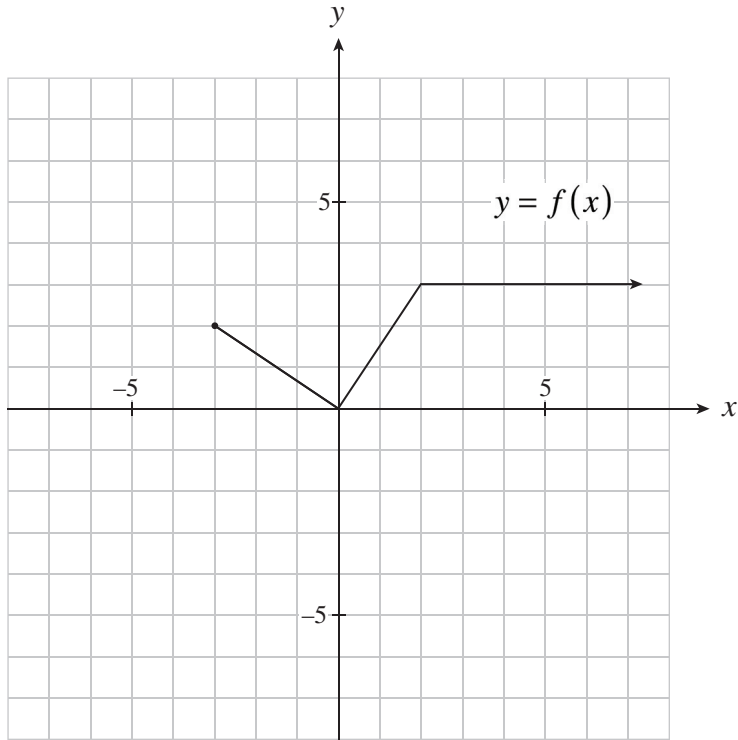2. Prove algebraically:

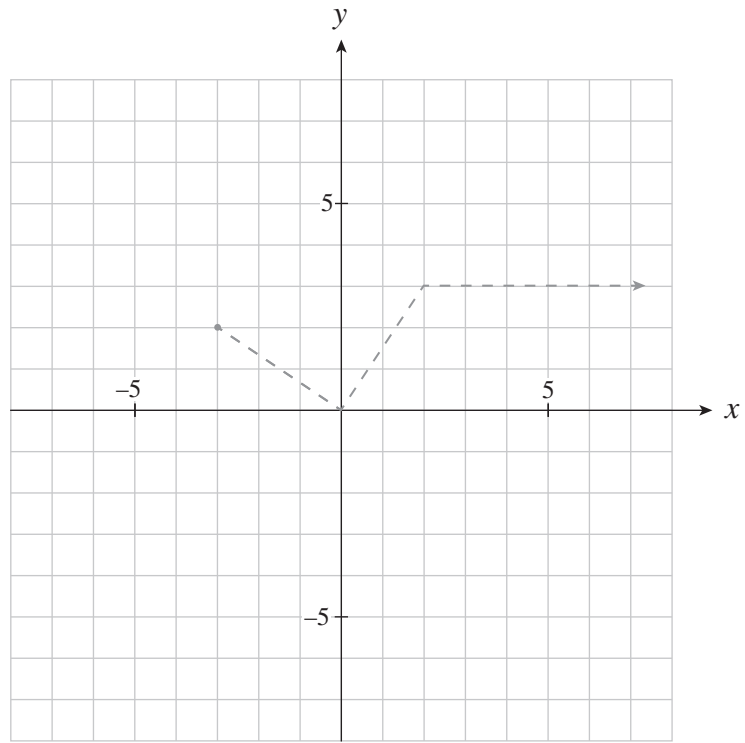$$\frac{\tan 2\theta \left(1 - \tan\theta\right)\cos^2\theta}{\sin 2\theta} = \frac{1}{1+\tan\theta}$$

LEFT SIDE	RIGHT SIDE

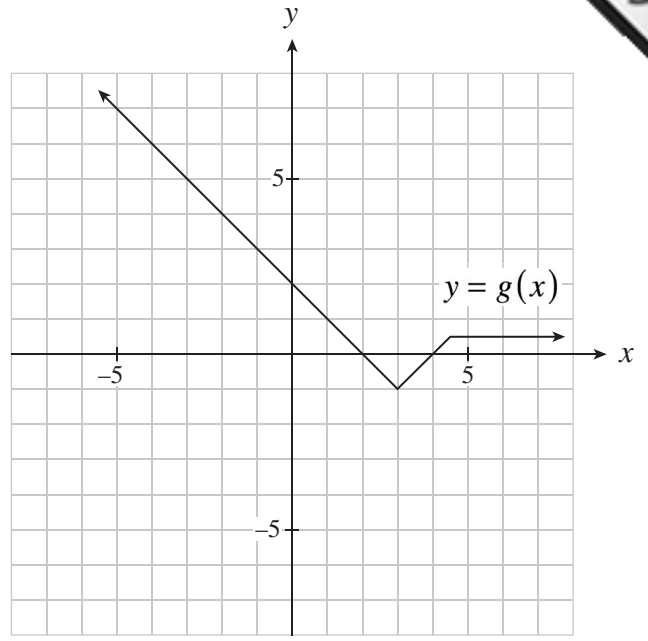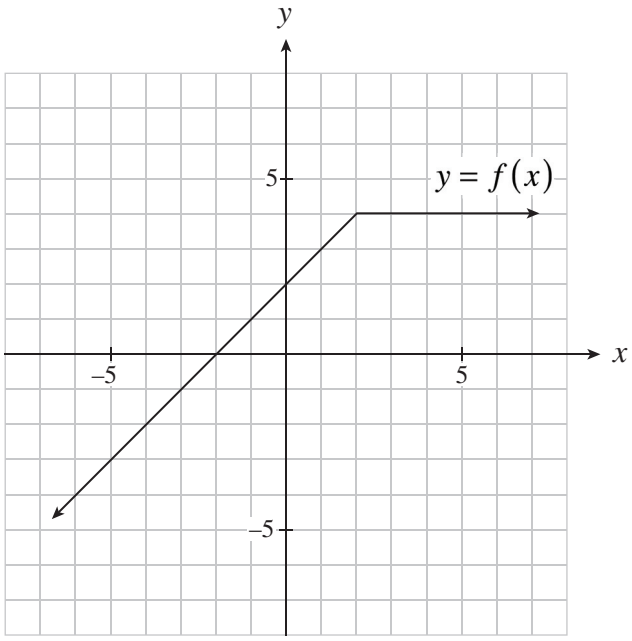3. The graph of $y = f(x)$ is shown below.
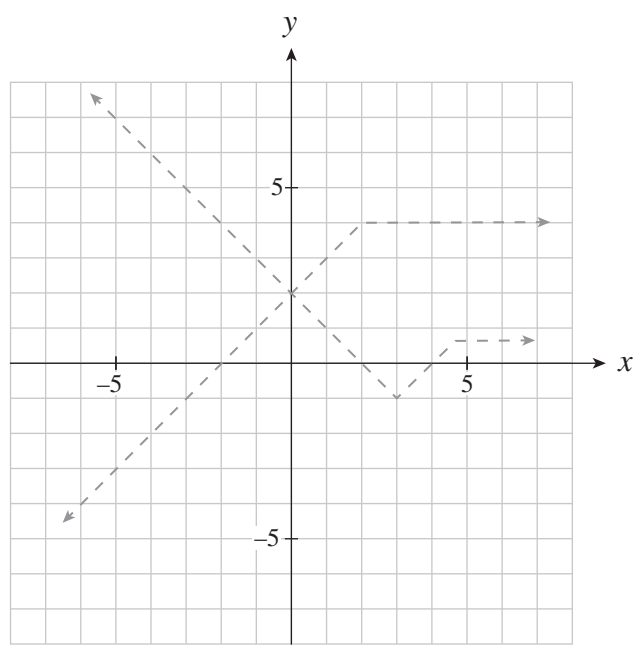

$y = f(x)$

On the grid provided, sketch the graph of $y = 2f(-x) - 3$. **(4 marks)**

4. Use the graphs of $y = f(x)$ and $y = g(x)$ shown to sketch the graph of $y = f(x)g(x)$ on the grid provided. Clearly indicate a sufficient number of points to get an accurate representation of your graph.

End of Exam Booklet I