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Principles of Mathematics 12

January 2004

Course Code = MA

Student Instructions

1. Place the stickers with your Personal Education Number (PEN) in the allotted spaces above. **Under no circumstance is your name or identification, other than your Personal Education Number, to appear on this booklet.**
2. Ensure that in addition to this examination booklet, you have an **Examination Response Form**. Follow the directions on the front of the Response Form.
3. **Disqualification** from the examination will result if you bring books, paper, notes or unauthorized electronic devices into the examination room.
4. When instructed to open this booklet, **check the numbering of the pages** to ensure that they are numbered in sequence from page one to the last page, which is identified by
END OF EXAMINATION.
5. At the end of the examination, place your Response Form inside the front cover of this booklet and return the booklet and your Response Form to the supervisor.

Question 1a:

1. .

(2)

Question 5a:

7. .

(3)

Question 1b:

2. .

(2)

Question 5b:

8. .

(2)

Question 2:

3. .

(5)

Question 6:

9. .

(4)

Question 3a:

4. .

(2)

Question 7:

10. .

(4)

Question 3b:

5. .

(2)

Question 4:

6. .

(4)

PRINCIPLES OF MATHEMATICS 12

January 2004

COURSE CODE = MA

GENERAL INSTRUCTIONS

1. Aside from an approved calculator, electronic devices, including dictionaries and pagers, are **not** permitted in the examination room.
2. All multiple-choice answers must be entered on the Response Form using an **HB pencil**. Multiple-choice answers entered in this examination booklet will **not** be marked.
3. For each of the written-response questions, write your answer in the space provided in this booklet. Rough-work space has been incorporated into the space allowed for answering each written-response question. You may not need all of the space provided to answer each question.
4. Ensure that you use language and content appropriate to the purpose and audience of this examination. Failure to comply may result in your paper being awarded a zero.
5. This examination is designed to be completed in **two hours**. *Students may, however, take up to 30 minutes of additional time to finish.*

PRINCIPLES OF MATHEMATICS 12 PROVINCIAL EXAMINATION

- | | Value | Suggested Time |
|---|------------------------|--------------------|
| 1. This examination consists of two parts: | | |
| PART A: 40 multiple-choice questions | 60 marks | 75 minutes |
| PART B: 7 written-response questions | 30 marks | 45 minutes |
| | Total: 90 marks | 120 minutes |
2. The last **four** pages inside the back cover contain **A Summary of Basic Identities and Formulae, The Standard Normal Distribution Table, Rough Work for Graphing, and Rough Work for Multiple-Choice**. These pages may be detached for convenient reference prior to writing this examination.
3. **A graphing calculator is essential for the Principles of Mathematics 12 Provincial Examination.** The calculator must be a hand-held device designed primarily for mathematical computations involving logarithmic and trigonometric functions, for graphing functions and for performing statistical tests. Computers, calculators with a QWERTY keyboard or symbolic manipulation abilities such as the Computer Algebraic System (CAS) and electronic writing pads will not be allowed. Students must not bring any external devices (peripherals) to support calculators such as manuals, printed or electronic cards, printers, memory expansion chips or cards, CD-ROMs, libraries or external keyboards. Students may have more than one calculator available during the examination, of which one may be a scientific calculator. Calculators may not be shared and must not have the ability to either transmit or receive electronic signals. In addition to an approved calculator, students will be allowed to use rulers, compasses, and protractors during the examination.
- Calculators must not have any information programmed into the memory which would not be acceptable in paper form.* Specifically, calculators must not have any built-in notes, definitions, or libraries. There is no requirement to clear memories at the beginning of the examination but the use of calculators with built-in notes is equivalent to the use of notes in paper form. Any student deemed to have cheated on a provincial examination will receive a “0” on that examination and will be permanently disqualified from the Provincial Examination Scholarship Program.
4. If, in a justification, you refer to information produced by the graphing calculator, this information must be presented clearly in the response. For example, if a graph is used in the solution of the problem it is important to sketch the graph, showing its general shape and indicating the appropriate values. If the statistical features of the calculator are used, it is important to show the function with the substitution of the relevant numbers. For example: in part of the solution it is acceptable to show $\text{normalcdf}(10, 40, 50, 20)$ or the equivalent syntax for the calculator used.
5. When using the calculator, you should provide a decimal answer that is correct to **at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

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PART A: MULTIPLE CHOICE

Value: 60 marks

Suggested Time: 75 minutes

INSTRUCTIONS: For each question, select the **best** answer and record your choice on the Response Form provided. Using an HB pencil, completely fill in the circle on the Response Form that has the letter corresponding to your answer.

- Convert $\frac{8\pi}{3}$ radians to degrees.
 - 60°
 - 120°
 - 240°
 - 480°

- Determine the minimum value of the function $y = -3\sin 2x + 4$.
 - 7
 - 3
 - 1
 - 1

- Solve: $2\sin x = \cos 3x$, where $0 \leq x < 2\pi$
 - 0.31, 3.45
 - 2.83, 5.98
 - 0.39, 2.75, 4.03, 5.30
 - 0.98, 2.16, 3.55, 5.89

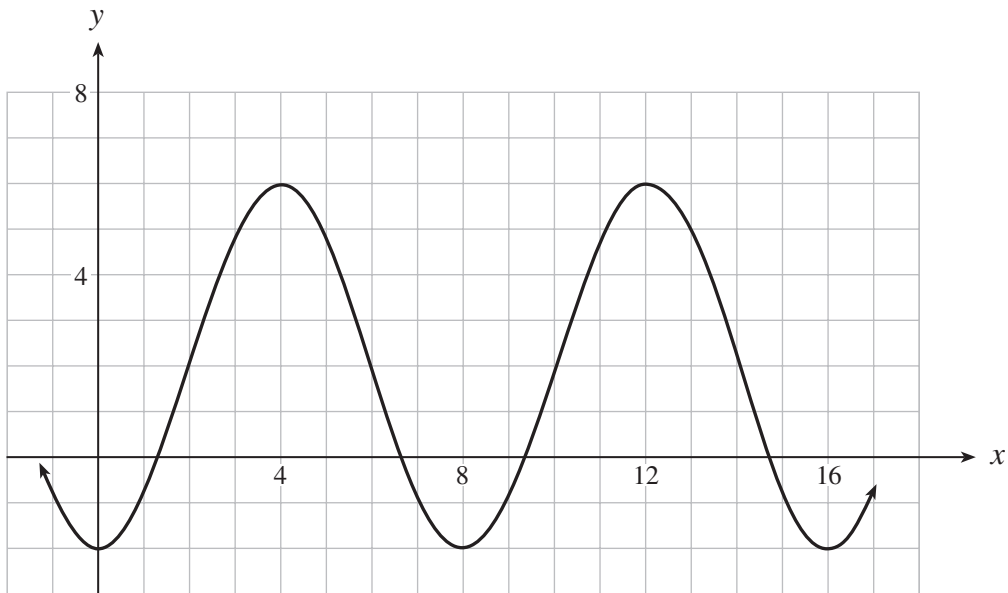
- Determine the exact value of $\sec \frac{5\pi}{4}$.
 - $-\sqrt{2}$
 - $-\frac{1}{\sqrt{2}}$
 - $\frac{1}{\sqrt{2}}$
 - $\sqrt{2}$

OVER

5. The terminal arm of angle θ , in standard position, passes through the point $(-2, 9)$. Determine the value of $\sin \theta$.

- A. $\frac{-2}{\sqrt{77}}$
- B. $\frac{9}{\sqrt{77}}$
- C. $\frac{-2}{\sqrt{85}}$
- D. $\frac{9}{\sqrt{85}}$

6. If the graph of the function shown below has the equation $y = a \sin b(x - c) + d$, determine the value of b . ($b > 0$)



- A. 4
- B. 8
- C. $\frac{\pi}{4}$
- D. $\frac{\pi}{8}$

7. Simplify: $4 \cos^2 6x - 2$
- A. $2 \cos 3x$
 - B. $4 \cos 3x$
 - C. $2 \cos 12x$
 - D. $4 \cos 12x$
8. In a seaport, the function $d(t) = 2.6 \sin 0.25(t - 5) + 3.3$ can be used to approximate the depth of the water, d metres, at time t hours after midnight. Estimate the number of hours in the 24-hour interval starting at $t = 0$ when the depth of the water is at least 3.5 m.
- A. 5.31 h
 - B. 11.95 h
 - C. 17.26 h
 - D. 23.90 h
9. The smallest positive solution of $\tan bx = 2$ is $x = 0.3$. Determine the general solution of $\tan bx = 2$.
- A. $0.3 + 2n\pi$, n is an integer
 - B. $0.3 + 2bn\pi$, n is an integer
 - C. $0.3 + \frac{n\pi}{b}$, n is an integer
 - D. $0.3 + \frac{2n\pi}{b}$, n is an integer
10. Determine the third term of the geometric sequence $x, 3x, \dots$, where $x \neq 0$.
- A. $5x$
 - B. $6x$
 - C. $9x$
 - D. $3x^2$

11. How many terms are there in the series defined by $\sum_{k=4}^{31} 2(3)^{k-1}$?
- A. 27
 - B. 28
 - C. 30
 - D. 31
12. Determine the sum of the first 10 terms of the geometric series defined by $\frac{2}{3} - 2 + 6 - 18 + \dots$
- A. -9 841.33
 - B. 3 280.67
 - C. 9 841.67
 - D. 19 682.67
13. In a geometric sequence, $t_2 = 480$ and $t_7 = -15$. Determine the common ratio, r .
- A. -3
 - B. -2
 - C. $-\frac{1}{3}$
 - D. $-\frac{1}{2}$
14. Consider the geometric sequence $1, (a + b), (a + b)^2, \dots$
Which term of this geometric sequence, when expanded, contains the expression $35a^4b^3$?
- A. 5th term
 - B. 6th term
 - C. 7th term
 - D. 8th term

15. Evaluate: $\log_3 59.2$

- A. 0.27
- B. 1.30
- C. 3.71
- D. 19.73

16. Determine the domain of $y = \log_a(-x)$.

- A. $x < 0$
- B. $x > 0$
- C. $x \leq 0$
- D. $x \geq 0$

17. Express as a single logarithm:

$$\log A - 3 \log B + \log C$$

- A. $\log \frac{AC}{3B}$
- B. $\log \frac{AC}{B^3}$
- C. $\log \frac{A}{B^3C}$
- D. $\log(A - 3B + C)$

18. If the point $(2, 9)$ is on the graph of $y = a^x$, what point must be on the graph of $y = \log_a x$?

- A. $\left(2, \frac{1}{9}\right)$
- B. $(2, 9)$
- C. $(9, -2)$
- D. $(9, 2)$

19. Solve: $\log_2(3-2x) - \log_2(2-x) = \log_2 3$
- A. -2
 - B. $\frac{1}{2}$
 - C. 3
 - D. no solution
20. The number of insects in a colony can triple in 7 weeks. After 50 weeks, how many times greater will the number of insects be than after 20 weeks?
- A. 81
 - B. 110.87
 - C. 243
 - D. 2.06×10^{14}
21. A radioactive substance decays from 600 g to 105 g in twelve days. Determine the half-life for this substance.
- A. 4.77 d
 - B. 5.27 d
 - C. 7.43 d
 - D. 30.17 d
22. Identify the conic that is described by $3x^2 + 5x - 2y + 6 = 0$.
- A. circle
 - B. ellipse
 - C. parabola
 - D. hyperbola

23. Change to general form: $\frac{(x-1)^2}{4} + \frac{(y+2)^2}{7} = 1$

- A. $7x^2 + 4y^2 - 5 = 0$
- B. $7x^2 + 4y^2 + 22 = 0$
- C. $7x^2 + 4y^2 - 14x + 16y - 5 = 0$
- D. $7x^2 + 4y^2 - 14x + 16y + 22 = 0$

24. Given the hyperbola $\frac{(x-1)^2}{25} - \frac{(y+3)^2}{4} = 1$, determine an equation of one of its asymptotes.

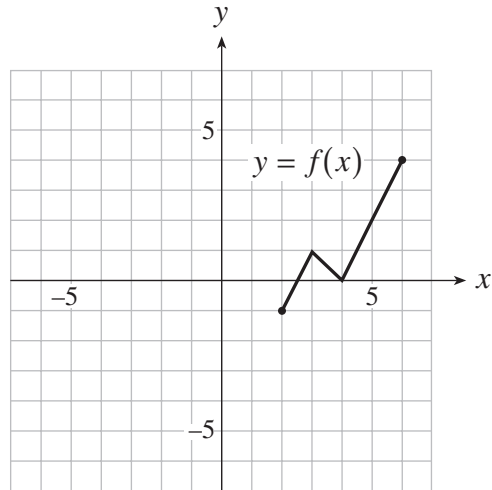
- A. $y = \frac{2}{5}x - \frac{17}{5}$
- B. $y = \frac{2}{5}x + \frac{17}{5}$
- C. $y = \frac{5}{2}x - \frac{11}{2}$
- D. $y = \frac{5}{2}x + \frac{11}{2}$

25. Which equation represents the graph of $y = g(x)$ after it is translated 5 units up?

- A. $y = g(x) + 5$
- B. $y = g(x) - 5$
- C. $y = g(x + 5)$
- D. $y = g(x - 5)$

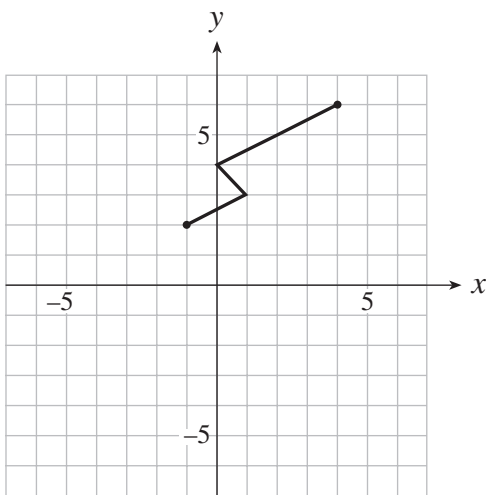
OVER

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

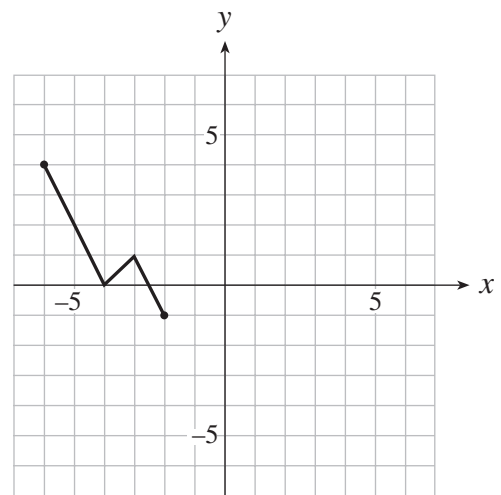


Which graph represents $x = f(y)$?

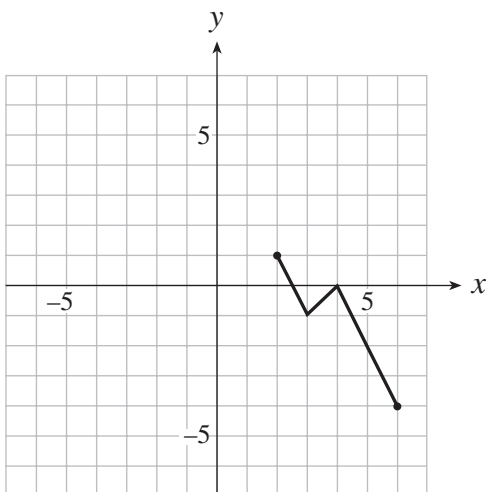
A.



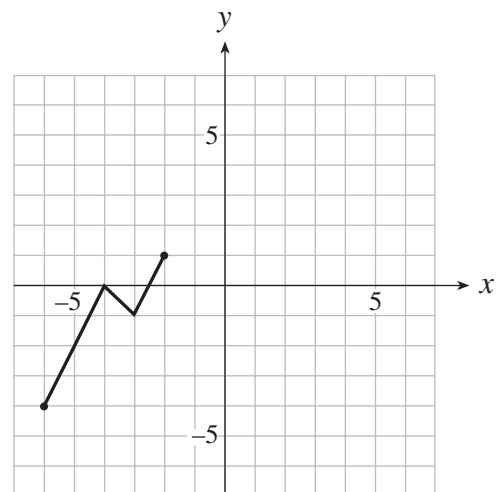
B.



C.



D.



27. If the graph of $x^2 + y^2 = 4$ is vertically compressed by a factor of $\frac{1}{5}$, then reflected in the y -axis, determine an equation for the new graph.
- A. $x^2 + \frac{y^2}{25} = 4$
- B. $x^2 + 25y^2 = 4$
- C. $-x^2 + 25y^2 = 4$
- D. $-x^2 + \frac{y^2}{25} = 4$
28. If the point $(4, 6)$ is on the graph of $y = f(x)$, what point must be on the graph of $y = 3\left(\frac{1}{f(x)}\right)$?
- A. $\left(12, \frac{1}{6}\right)$
- B. $\left(4, \frac{1}{18}\right)$
- C. $\left(4, \frac{1}{2}\right)$
- D. $(2, 18)$
29. A couple is planning an evening out. They have a choice of 4 restaurants for dinner, 6 movies following dinner, and 4 coffee establishments for after the movie. How many different ways can they plan the evening if they choose one of each?
- A. 6
- B. 14
- C. 48
- D. 96
30. How many different ways are there to arrange the letters in the word T S A W W A S S E N ?
- A. 25 200
- B. 151 200
- C. 302 400
- D. 3 628 800

31. When rolling 2 fair six-sided dice, what is the probability of obtaining a sum that is at most 4?
- A. $\frac{1}{12}$
 - B. $\frac{5}{36}$
 - C. $\frac{1}{6}$
 - D. $\frac{5}{6}$
32. A 7-card hand is dealt from a standard deck of 52 cards. What is the probability that the hand will contain 3 clubs and 4 red cards?
- A. 0.0015
 - B. 0.0246
 - C. 0.0320
 - D. 0.2905
33. In a recent survey of grade 12 students, it was found that 72% took mathematics and 53% took chemistry. If 77% took mathematics or chemistry, what percent of students took mathematics only?
- A. 5%
 - B. 19%
 - C. 24%
 - D. 48%
34. The probability of having type A disease is 6%. The test to determine if a person has type A disease is 80% accurate. This means that the outcome of the test is correct 80% of the time. What is the probability that a randomly selected person tests positive?
- A. 0.048
 - B. 0.236
 - C. 0.752
 - D. 0.80

35. Given a standard normal curve, determine the approximate value of $P(-2 < Z < 2)$.
- A. 50%
 - B. 68%
 - C. 95%
 - D. 99.7%
36. The heights of basketball players at BC Provincial Tournaments are normally distributed with a mean of 185.42 cm and a standard deviation of 7.62 cm. What percent of players at these tournaments have heights between 180 cm and 190 cm?
- A. 47%
 - B. 49%
 - C. 51%
 - D. 53%
37. A population of scores is normally distributed with a mean of 52.4 and a standard deviation of 14.3. If 40% of the scores are higher than a particular score x , calculate the value of x .
- A. 48.8
 - B. 56.0
 - C. 60.1
 - D. 80.7
38. If the normal approximation to the binomial distribution is used, which expression best estimates the probability of correctly guessing between 10 and 15 answers inclusive on a 25-question true-false test?
- A. $P(10.5 < X < 14.5)$
 - B. $P(10.5 < X < 15.5)$
 - C. $P(9.5 < X < 14.5)$
 - D. $P(9.5 < X < 15.5)$

39. A fair six-sided die is rolled n times. If the standard deviation of the number of times a 5 comes up is 10, determine the value of n .
- A. 400
 - B. 625
 - C. 720
 - D. 800
40. Determine the standard deviation of the population $a - 2b, a, a + 2b$, where a and b can be any real numbers with $b > 0$.
- A. b
 - B. $2b$
 - C. $\frac{4}{\sqrt{3}}b$
 - D. $\frac{2\sqrt{2}}{\sqrt{3}}b$

This is the end of the multiple-choice section.
Answer the remaining questions directly in this examination booklet.

PART B: WRITTEN RESPONSE

Value: 30 marks

Suggested Time: 45 minutes

INSTRUCTIONS: 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. Where required, place the final answer for each question in the space provided.

If, in a justification, you refer to information produced by the graphing calculator, this information must be presented clearly in the response. For example, if a graph is used in the solution of the problem it is important to sketch the graph, showing its general shape and indicating the appropriate values. If the statistical features of the calculator are used, it is important to show the function with the substitution of the relevant numbers. For example: in part of the solution it is acceptable to show $\text{normalcdf}(10, 40, 50, 20)$ or the equivalent syntax for the calculator used.

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

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

1. a) A theatre company of 13 actors consists of 8 men and 5 women. How many different ways are there to choose from the theatre company a group of 7 with exactly 3 men? **(2 marks)**

ANSWER:

- b) A theatre company of 13 actors consists of 8 men and 5 women. How many different ways are there to choose from the theatre company a group of 6 with at least 4 women? **(2 marks)**

ANSWER:

OVER

2. Solve algebraically using logarithms: $2^x = 5^{x+1}$
(Answer accurate to at least 2 decimal places.)

(5 marks)

ANSWER:

3. The probability of Bruce sinking a one-metre putt is 85%.

- a) Assuming independence, what is the probability that Bruce sinks exactly 10 out of 12 one-metre putts? (Answer accurate to at least 4 decimal places.) **(2 marks)**

ANSWER:

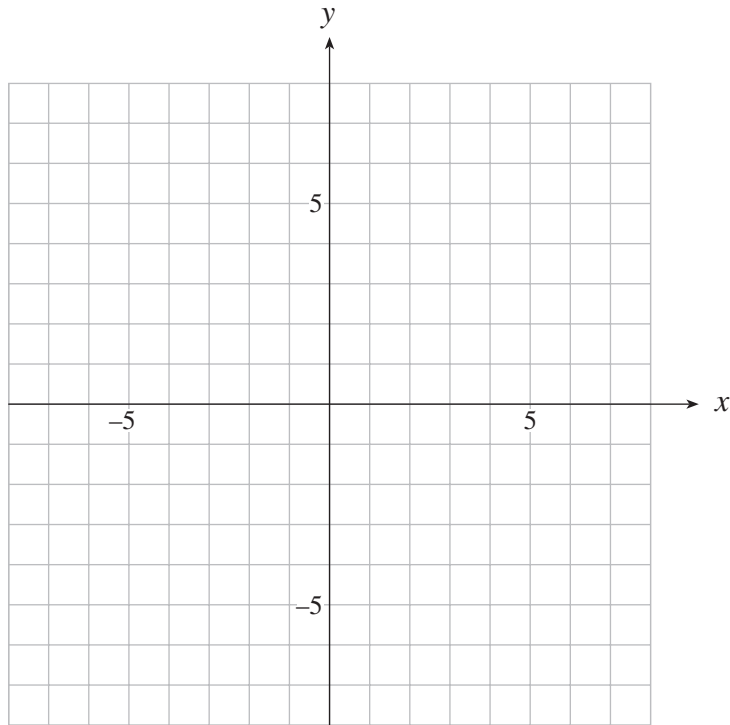
- b) Assuming independence, what is the probability that Bruce sinks at least 10 out of 12 one-metre putts? (Answer accurate to at least 4 decimal places.) **(2 marks)**

ANSWER:

OVER

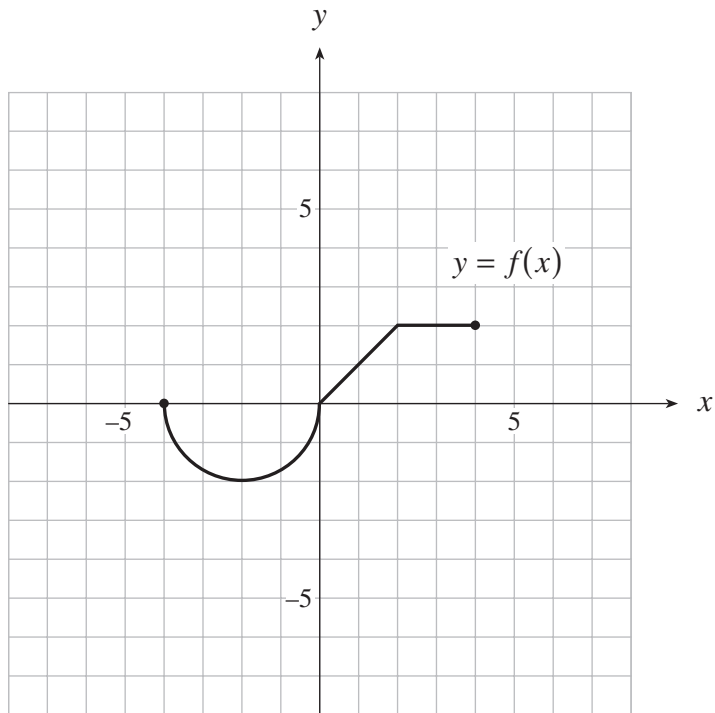
4. An ellipse has vertices $(3, -2)$ and $(3, 6)$. If the ellipse passes through the point $(0, 0)$, determine the equation of the ellipse in standard form. **(4 marks)**

Grid is provided for rough work only.



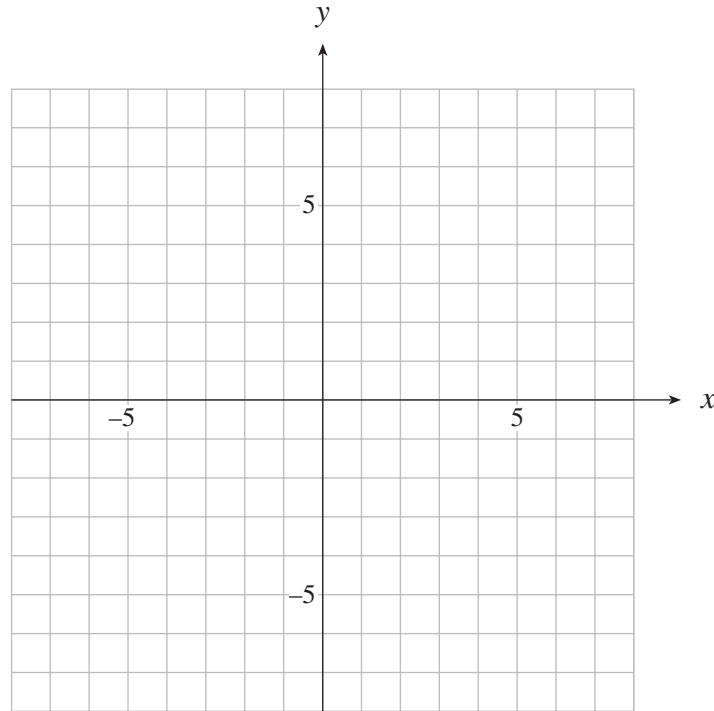
ANSWER:

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



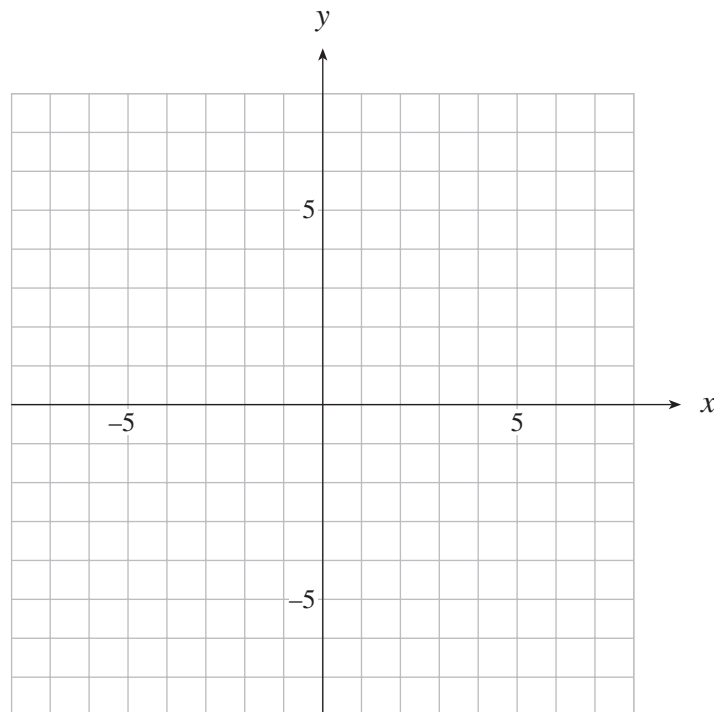
a) Graph: $y = -2f(x + 3)$

(3 marks)



b) Graph: $y = \left| f\left(\frac{x}{2}\right) \right|$

(2 marks)



6. Solve algebraically, giving exact values, where $0 \leq x < 2\pi$.

(4 marks)

$$2 \tan x \sin x - \tan x = 0$$

ANSWER:

7. Prove the identity:

(4 marks)

$$\frac{\cos x + \cot x}{\sec x + \tan x} = \cos x \cot x$$

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END OF EXAMINATION

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A SUMMARY OF BASIC IDENTITIES AND FORMULAE

Pythagorean Identities:

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

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$1 + \cot^2 \theta = \csc^2 \theta$$

Reciprocal and Quotient Identities:

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

Addition Identities:

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

Double-Angle Identities:

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$$

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$= 2 \cos^2 \theta - 1$$

$$= 1 - 2 \sin^2 \theta$$

Formulae:

$$t_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r}$$

$$S_n = \frac{a-r\ell}{1-r}$$

$$S = \frac{a}{1-r}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Probability and Statistics:

$${}_n P_r = \frac{n!}{(n-r)!}$$

$${}_n C_r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

$$t_{k+1} = {}_n C_k a^{n-k} b^k$$

$$P(\bar{A}) = 1 - P(A)$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A | B) = \frac{P(A \text{ and } B)}{P(B)}$$

$$P(A \text{ and } B) = P(A) \times P(B | A)$$

$$P(x) = {}_n C_x p^x q^{n-x}$$

$$(q = 1 - p)$$

$$\mu = \frac{\sum x_i}{n}$$

$$\sigma = \sqrt{\frac{\sum (x_i - \mu)^2}{n}}$$

$$\mu = np$$

$$\sigma = \sqrt{npq}$$

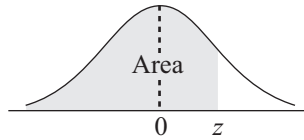
$$z = \frac{x - \mu}{\sigma}$$

Note: Graphing calculators will contain many of these formulae as pre-programmed functions.

**You may detach this page for convenient reference.
Exercise care when tearing along perforations.**

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THE STANDARD NORMAL DISTRIBUTION TABLE



$$F_z(z) = P[Z < z]$$

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0017	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0352	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0722	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

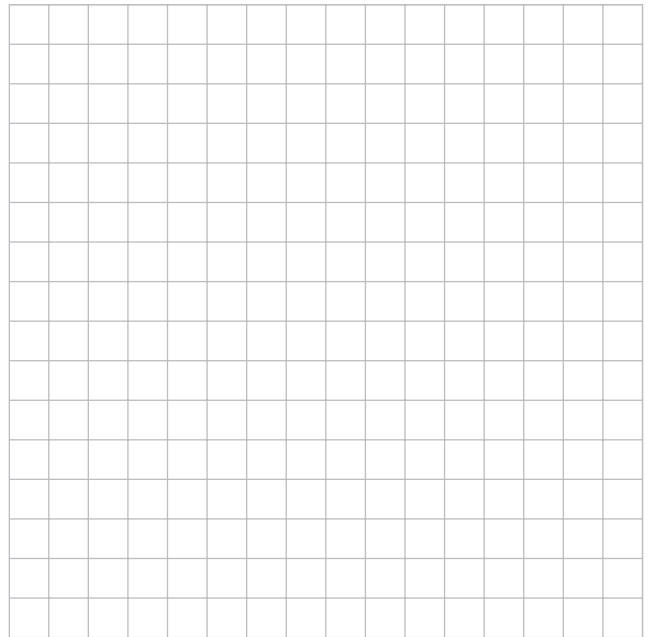
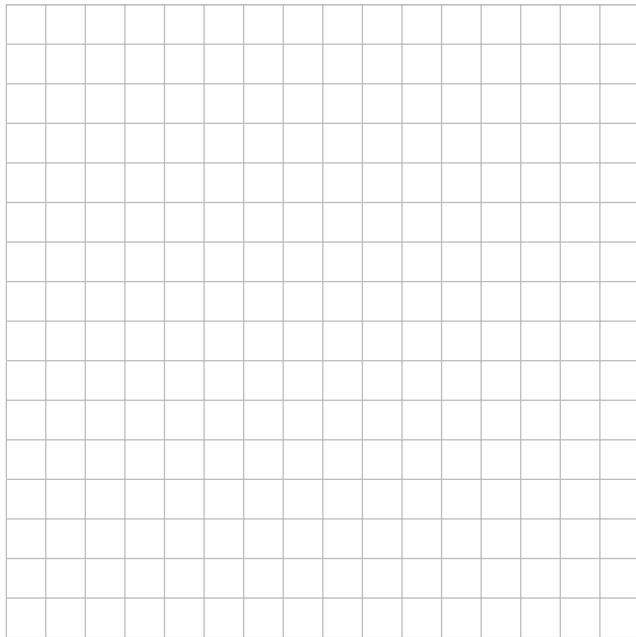
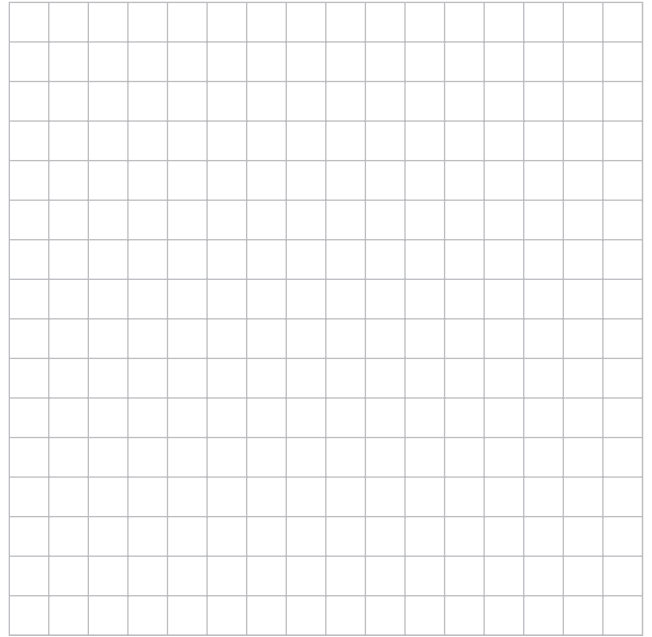
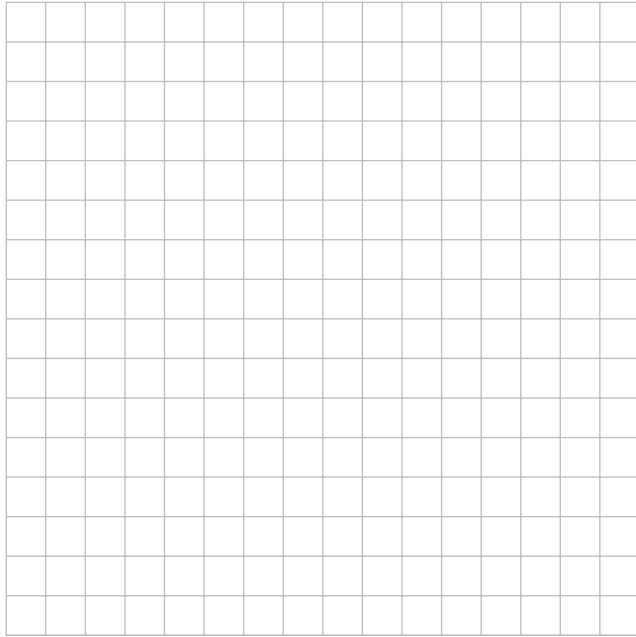
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$$F_z(z) = P[Z < z]$$

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9278	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

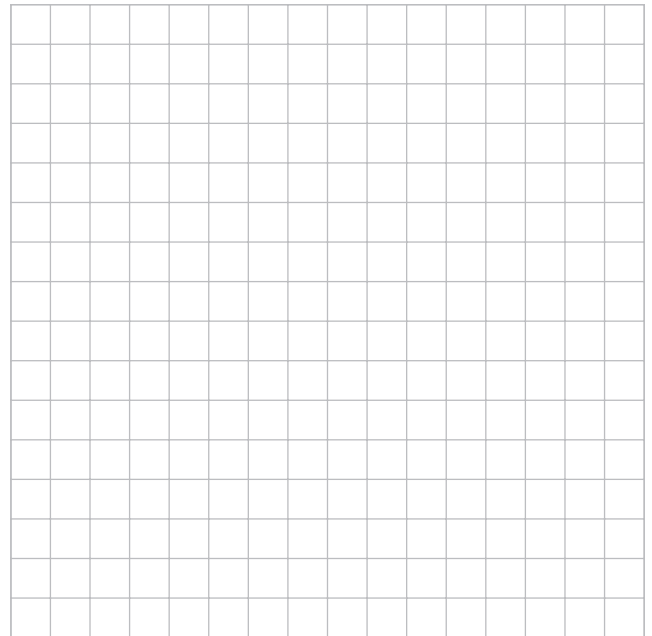
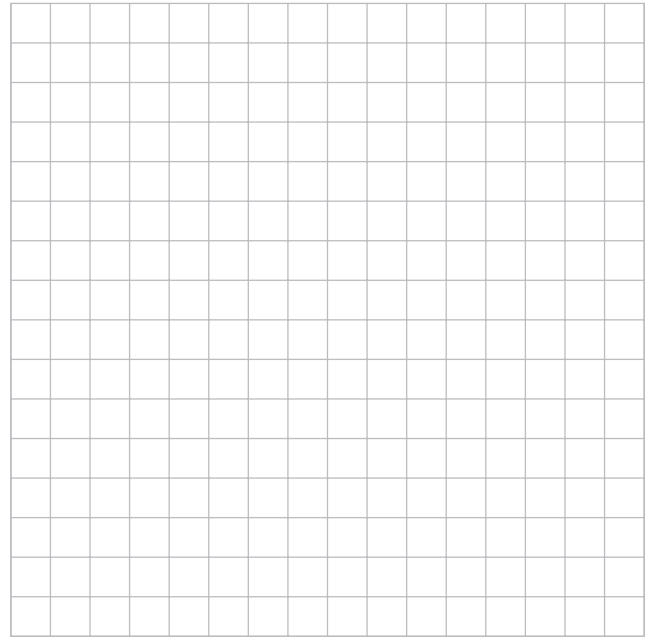
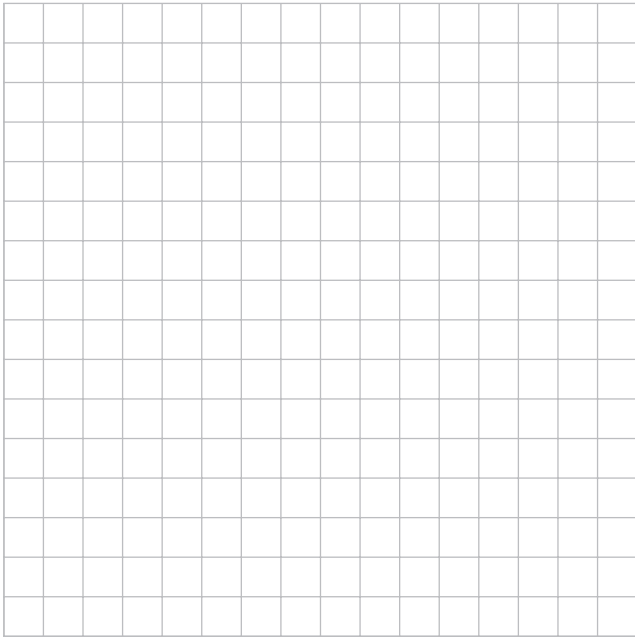
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