BRITISH COLUMBIA

Principles of Mathematics 10

June 2004 Examination

(Updated as of January 2005)

Student Instructions

1. Ensure that in addition to this **Student Booklet**, you have a **Response Form**.
2. **Disqualification** from the examination will result if you bring books, paper, notes or unauthorized electronic devices into the examination room.
3. This examination is designed to be completed in **two hours**. *Students may, however, take up to 30 minutes of additional time to finish.*
4. At the end of the examination, return this **Student Booklet** and the **Response Form** to the supervisor.

PRINCIPLES OF MATHEMATICS 10 PROVINCIAL EXAMINATION

INSTRUCTIONS

1. All answers must be entered on the Response Form using an **HB pencil**.
   Answers entered in this examination booklet will **not** be marked.
2. A *Formulae Sheet* is provided at the back of this booklet. *Rough Work for Graphing* and *Rough Work Space* are also located at the back of the examination.
3. Use the value of π programmed in your calculator rather than the approximation of 3.14.
4. When using the calculator, rounding should occur **only in the final step** of the solution.
5. The provincial examination consists of 60 questions worth one mark each. There are **four** types of questions:

4	True-and-False Questions
8	Numerical-Response Questions
12	Matching Questions
36	Multiple-Choice Questions
60	**Total**

6. When answering **Numerical-Response** questions, please note the following:

   - Find the correct question number on the Response Form and write your answer in the spaces provided, noting proper place value. **Only one digit per box.**
   - PRINT your digits **as shown below**. Keep within the box provided.

   - Negative answers must include a shaded negative circle. If neither circle is bubbled, the answer will be read as positive.
   - Leave unused boxes blank.
   - For example, the answer **−70.6** will be written as shown.

1. Which of the following are rational numbers?

I.	$\sqrt{53}$
II.	$-\frac{4}{3}$
III.	$0.\overline{84}$
IV.	$\sqrt[4]{9}$

A. I and II only
B. II and III only
C. III and IV only
D. I, II, III and IV

2. Bill's regular wage is $12.50 per hour for the first eight hours each day. After 8 h, he is paid $25.00 per hour for overtime. The table below shows the number of hours he worked one week.

Day	Hours Worked
Monday	7
Tuesday	9
Wednesday	8
Thursday	11
Friday	6

Calculate his wages for the week shown above.

A. $512.50
B. $562.50
C. $762.50
D. $1025.00

3. Which of the following statements is correct about a jacket in Canadian dollars?

	U.S.A.	Switzerland
Regular price of jacket	$35.79 US	45 Swiss Francs
Exchange	$1.00 US = $1.1929 CDN	1 Swiss Franc = 0.9487 CDN
Price in Canadian dollars		

A. The price is lower in the U.S.A.
B. The price is higher in the U.S.A.
C. The prices are the same in both countries.
D. The prices cannot be determined from the information given.

4. Which of the following are the numbers in Row 12 ?

	Column		
Row	**A**	**B**	**C**
1	5	8	11
2	23	26	29
3	41	44	47
⋮	⋮	⋮	⋮

A. | 59 | 62 | 65 |

B. | 78 | 81 | 84 |

C. | 185 | 188 | 191 |

D. | 203 | 206 | 209 |

Use the following information to answer question 5.

The student government put up posters that read:

They found that 95% of those students who voted said "Yes" to a 4-day school week.

5. The wording on the posters can bias the results.

   A. True
   B. False

6. Sue wants to survey the students about the food quality in the cafeteria. Choose the sampling method that is most random.

   A. Each student in the school is assigned a 5-digit number and then 50 students are randomly selected.
   B. The first 10 people to school in the morning are surveyed.
   C. Survey the senior boys' football team.
   D. Survey all grade 10s.

7. Alaina saves part of her salary from her weekend job. She invests this amount in an account that pays 4.25% annual interest.

Year	Opening Balance ($)	Interest Rate (%)	Interest Earned ($)	Closing Balance ($)
1		4.25	21.25	
2		4.25		

What is the closing balance at the end of Year 2? Answer to two decimal places.

Record your answer neatly on the Response Form.

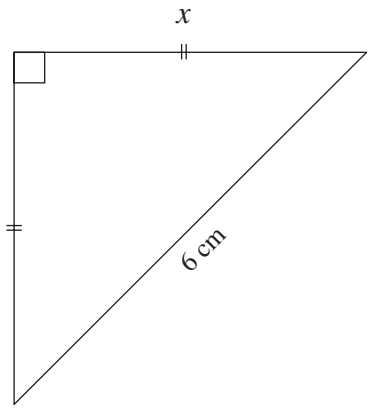
8. Simplify: $5\sqrt{2} + 2\sqrt{2} - 4\sqrt{2}$

A. $11\sqrt{2}$
B. $7\sqrt{2}$
C. $4\sqrt{2}$
D. $3\sqrt{2}$

Match each Irrational Expression on the left with the correct Equivalent Form on the right. Each Equivalent Form may be used once, more than once or not at all.

Irrational Expression	Equivalent Form
9. $2\sqrt{20}-\sqrt{45}+\sqrt{80}$	A. 5
10. $\left(2-\sqrt{5}\right)^2$	B. $5\sqrt{5}$
11. $\dfrac{\sqrt{5}}{\sqrt{5}+\sqrt{6}}$	C. $9-4\sqrt{5}$
	D. $\sqrt{30}-5$
	E. $5-\sqrt{30}$
	F. $\dfrac{\sqrt{6}}{6}$

12. Find the length of side x .



A. 2.45 cm
B. 3.00 cm
C. 4.24 cm
D. 8.49 cm

13. Simplify: $\left(\frac{27}{125}\right)^{\frac{2}{3}}$

A. $\frac{250}{81}$

B. $\frac{25}{9}$

C. $\frac{9}{25}$

D. $-\frac{18}{125}$

14. Simplify: $\sqrt{\frac{1}{x^3}}$

A. $x^{-\frac{3}{2}}$

B. $x^{-\frac{2}{3}}$

C. $\left(\sqrt[3]{-x}\right)^2$

D. $-\sqrt{x^3}$

15. Marty is paying off a credit card bill of $3000. He will pay $800 at the end of each month.

Month	Opening Balance ($)	Interest ($)	Payment ($)	Closing Balance ($)
1	3000.00	60.00	800.00	2260.00
2	2260.00	45.20	800.00	1505.20

If Marty's opening balance was changed from $3000 to $2000, what would be the closing balance at the end of month 2? Answer to two decimal places.

Record your answer neatly on the Response Form.

16. In the arithmetic sequence $-4,\ 2,\ 8,\ 14, \ldots,$ the common difference is 6.

A. True
B. False

17. What is the sum of the arithmetic series $9 + 16 + 23 + \ldots + 114$?

A. 162
B. 324
C. 861
D. 984

18. Determine the value of x in the geometric sequence $-281.25,\ 112.5,\ x,\ 18.$

A. –65.25
B. –50.25
C. –45
D. 65.25

19. What is the common difference for the following arithmetic sequence?

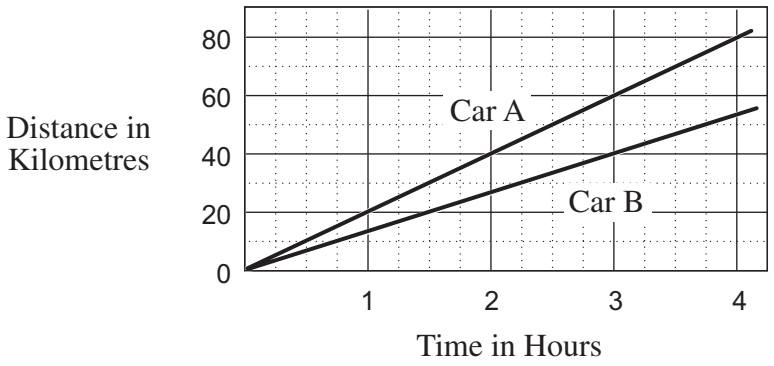
$$-2\ ,\ \_\_\_\_\ ,\ \_\_\_\_\ ,\ \_\_\_\_\ ,\ 26$$

A. 4.8
B. 5.6
C. 7
D. 24

20. Tim earns a base salary of $500 per week plus $18 for each phone he sells. What is his salary if he sells 25 phones one week? Answer to the nearest dollar.

Record your answer neatly on the Response Form.

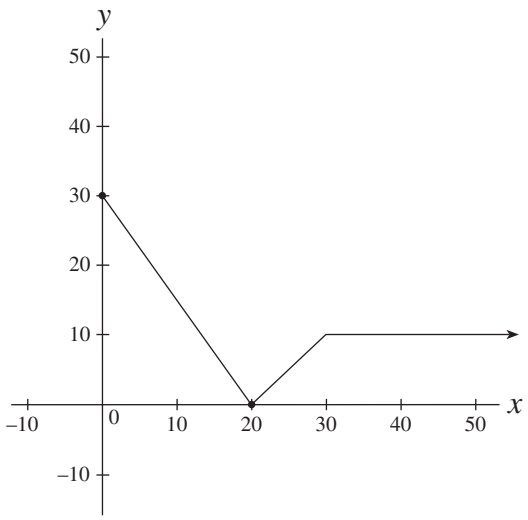
21. The distance travelled by two cars is shown in the graph below.



How much farther did Car A go than Car B in 1 h 30 min?

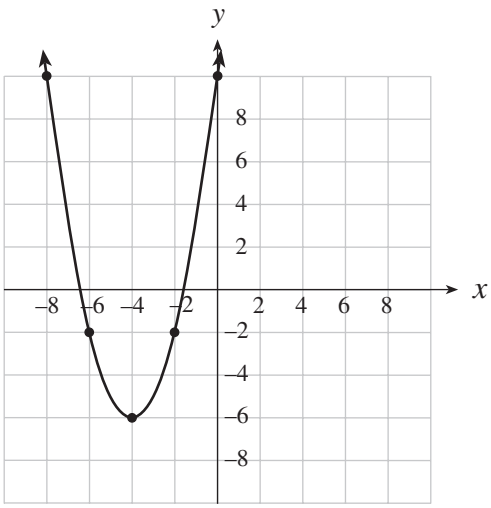
A. 10 km
B. 20 km
C. 25 km
D. 30 km

22. What is the domain of the function graphed below?



A. $x \geq 0$
B. $0 \leq x \leq 30$
C. $20 \leq x \leq 30$
D. all real numbers

Use the following graph to answer question 23.



23. For what value of x does $f(x) = -6$?

A. -6
B. -4
C. -2
D. 0

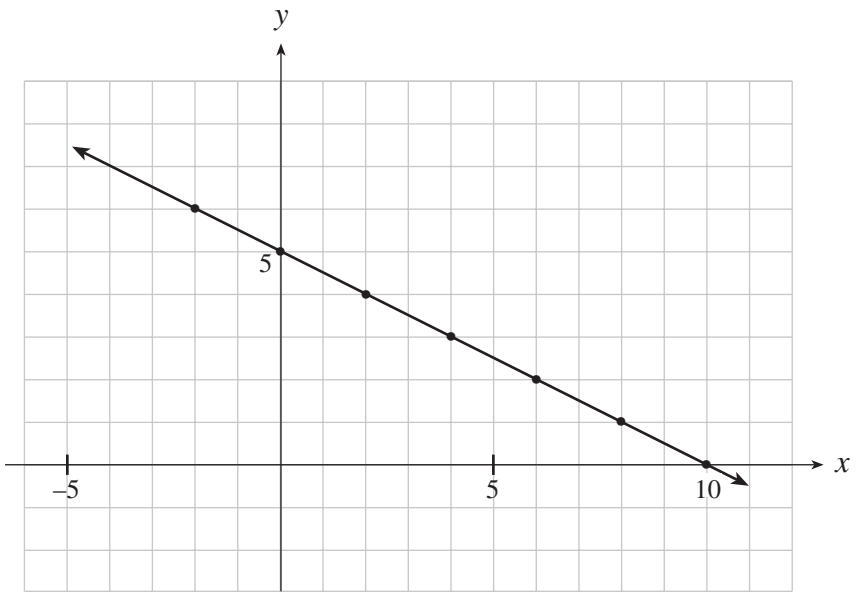
24. If $f(x) = 2x^2 - x + 4$, which of the following is the value of $f(6)$?

A. 6
B. 22
C. 34
D. 70

25. Which of the following has a slope of -1?

A. $y = -x + 1$
B. $y = x + 1$
C. $y = -1$
D. $x = -1$

26. Consider the following graph.

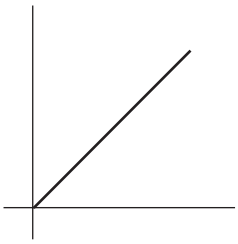
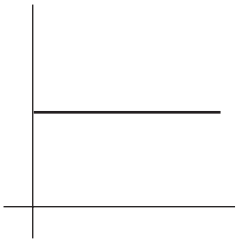
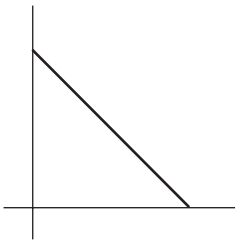
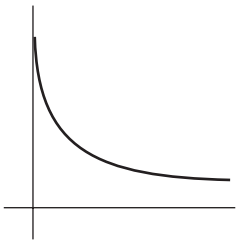
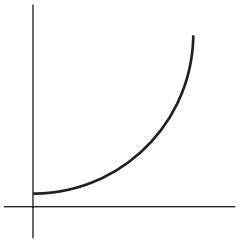
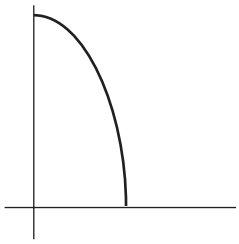


Which of the following can be used to represent the function shown by the graph?

I.	$(8,\ -6)\ (5,\ 0)\ (4,\ 2)\ (0,\ 10)$
II.	$x + 2y - 10 = 0$
III.	y is less than half x

A. I only
B. II only
C. I and II only
D. I, II and III

Match each Description on the left with the best Graph on the right.
Each Graph may be used once, more than once or not at all.

Description	Graph
27. Distance as a function of time, where speed is constant and non-zero. 28. Temperature of a cup of hot water left on a table as a function of time. 29. Height above the water of a rock dropped from a bridge as a function of time.	A.  B.  C.  D.  E.  F. 

30. Consider the following information:

$$y \text{ varies partially as } x$$
$$\text{when } x = 2,\ y = 4$$
$$\text{and when } x = 0,\ y = -2$$

What is the value of the constant of variation (constant of proportionality)?

Record your answer neatly on the Response Form.

31. Simplify: $(2x-5)(3x^2+4x+1)$

A. $6x^3+7x^2-22x-5$
B. $6x^3-7x^2-18x-5$
C. $6x^3-23x^2-18x-5$
D. $6x^3-23x^2-22x-5$

32. Simplify: $(2x+1)(3x-4)-(3x-5)$

A. $6x^2-8x+1$
B. $6x^2-8x-9$
C. $6x^2-14x+1$
D. $6x^2-14x-9$

33. What value of k will make the following trinomial a perfect square?

$$kx^2-40xy+25y^2$$

Record your answer neatly on the Response Form.

Match each Expression on the left with one of its Factors on the right.
Each Factor may be used once, more than once or not at all.

Expression	Factor
34. $x^2 + 2x - 8$	A. $x + 4$
35. $9x^2 - 4$	B. $x - 4$
36. $3x^2 + 2x - 8$	C. $3x + 2$
	D. $3x + 4$
	E. $3x - 4$
	F. $x - 3$

37. The following expression is undefined when $x = 4$.

$$\frac{x(x+4)}{(x-4)(x+6)}$$

A. True
B. False

38. What is the remainder when $x^3 - 5x - 18$ is divided by $x - 2$?

A. 0
B. −1
C. −16
D. −20

39. Simplify: $\frac{42y^2 - 35y}{7y}$; $y \neq 0$

A. $35y - 42$

B. $6y^2 - 5y$

C. $6y + 5$

D. $6y - 5$

40. Simplify for all permissible values of x:

$$\frac{x^2 - 7x + 6}{x^2 - 2x - 24}$$

A. $\frac{x+1}{x-4}$

B. $\frac{x-1}{x-4}$

C. $\frac{x-1}{x+4}$

D. $\frac{x+1}{x+4}$

41. Given that both rational expressions are defined, what is the value of k ?

$$\frac{3x^2 + 13x + k}{2x^2 + 9x - 5} = \frac{3x - 2}{2x - 1}$$

Record your answer neatly on the Response Form.

42. Simplify for all permissible values of x:

$$\frac{5}{2x} - \frac{7}{x} + \frac{x}{2}$$

A. $\frac{x-2}{2x}$

B. $\frac{x^2-9}{2x}$

C. $\frac{x^2+19}{2x}$

D. $\frac{2x^2-4x}{2x}$

43. Simplify for all permissible values of x

$$\frac{x^2-2x-8}{x^2+2x-8} \div \frac{x-4}{x-2}$$

A. $\frac{x-4}{x+2}$

B. $\frac{x+4}{x+2}$

C. $\frac{x-2}{x-4}$

D. $\frac{x+2}{x+4}$

44. Solve for m:

$$\frac{1}{3m} = \frac{1}{m} + \frac{1}{3};\ m \neq 0$$

A. -2
B. 0
C. 2
D. 3

45. Solve for x:

$$\frac{6}{x+3} = \frac{4}{x+4};\ x \neq -3,\ -4$$

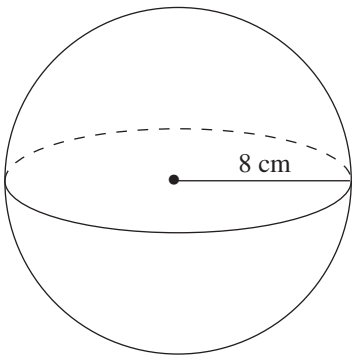
A. 18

B. $-\frac{1}{2}$

C. -1

D. -6

46. Which of the following expressions represents the surface area of the sphere below?



A. $\frac{4}{3}\pi(8)^3\ \text{cm}^2$

B. $4\pi(8)\ \text{cm}^2$

C. $4\pi(8)^2\ \text{cm}^2$

D. $4\pi(8)^3\ \text{cm}^2$

47. The side length of a cube is halved. What fraction of the initial volume remains?

A. $\frac{1}{8}$

B. $\frac{1}{6}$

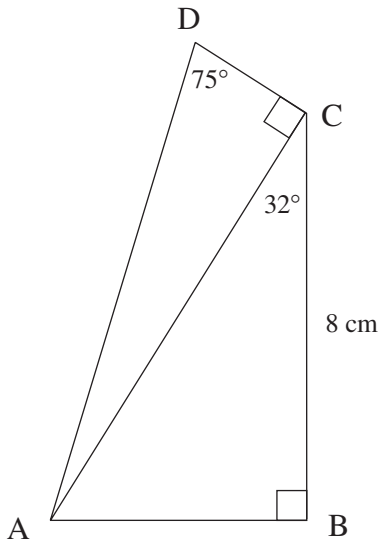
C. $\frac{1}{4}$

D. $\frac{1}{2}$

48. A 4 m ladder is placed against the side wall of a house. It reaches a window that is 3 m high. What is the slope of the ladder?

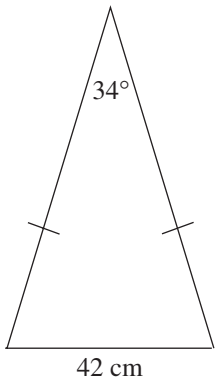
A. 0.75
B. 0.88
C. 1.13
D. 2.65

49. What is the length, in centimetres, of side AD?



Record your answer neatly on the Response Form.

50. An isosceles triangle has a base of 42 cm with an opposite angle of 34°.



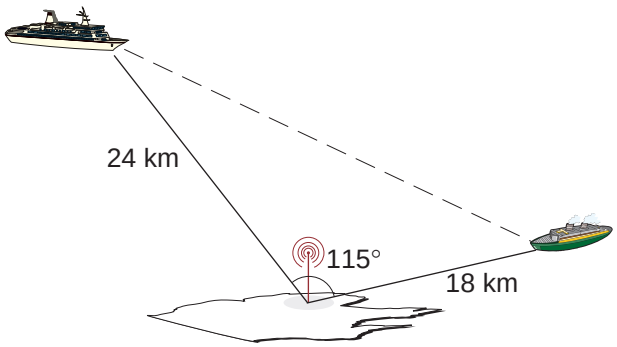
What is the perimeter of the triangle?

A. 86 cm
B. 117 cm
C. 126 cm
D. 186 cm

51. What is the value of $\cos A$ if $\sin A = 0.9659$ and $\angle A$ is an **obtuse** angle.

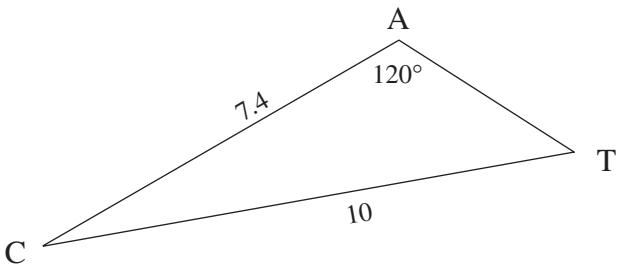
A. –0.2589
B. –0.0169
C. 0.0169
D. 0.2589

52. A radar tracking station locates the position of two ships. How far apart are the ships?



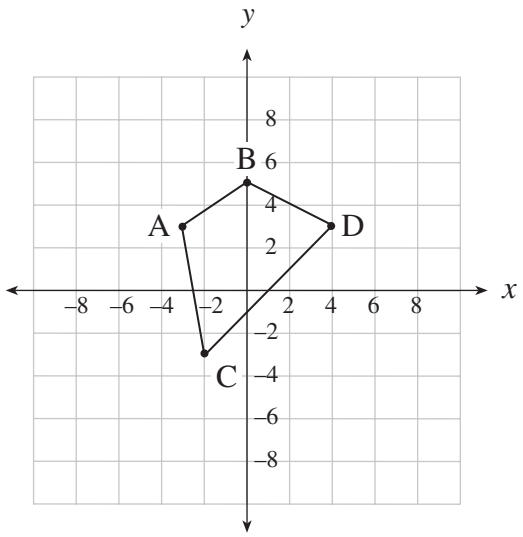
A. 20.18 km
B. 23.13 km
C. 35.57 km
D. 1265.14 km

53. The measure of $\angle T$, to the nearest degree, is 50°.



A. True
B. False

54. Which of the following does the point $(1,\ 0)$ represent?



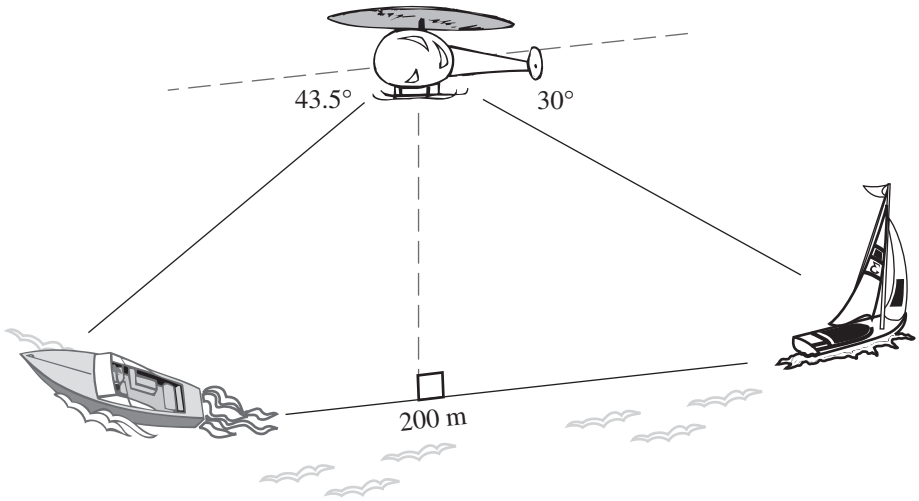
A. endpoint of line segment $\overline{AC}$

B. midpoint of line segment $\overline{CD}$

C. x-intercept of line segment $\overline{AC}$

D. y-intercept of line segment $\overline{CD}$

55. A helicopter is flying above a lake when the pilot sees a boat below at an angle of depression of 43.5°. On the other side of the aircraft he sees another boat at an angle of depression of 30°. The boats are 200 m apart.



What is the height of the helicopter, in metres, above the water? Answer to two decimal places.

Record your answer neatly on the Response Form.

56. Consider the following line segments:

For $\overline{AB}$, $A(10,\ 2)$ and $B(6,\ -4)$

For $\overline{CD}$, $C(5,\ 8)$ and $D(-2,\ 6)$

Which of the following statements is correct?

A. $\overline{AB}$ is longer than $\overline{CD}$.

B. $\overline{CD}$ is longer than $\overline{AB}$.

C. $\overline{AB}$ is the same length as $\overline{CD}$.

D. The lengths of the line segments cannot be determined from the given information.

Match each Characteristic on the left with the correct Equation on the right.
Each Equation may be used once, more than once or not at all.

Characteristic	Equation
57. Parallel to line $5x - 2y - 4 = 0$	A. $y = -\frac{5}{2}x - 2$
58. Has the same x-intercept as the line $y = \frac{1}{3}x - 2$	B. $y = \frac{4}{3}x + \frac{1}{6}$
59. Perpendicular to line $4x - 3y + 11 = 0$	C. $y = -\frac{3}{4}x - 7$
	D. $y = \frac{5}{2}x + 3$
	E. $y = -\frac{4}{3}x + 8$

60. $(0.5,\ 0)$ is the midpoint of line segment $\overline{\text{KL}}$, with $\text{K}(-7,\ -5)$. What is the ***x*-coordinate** of point L?

A. -14.5
B. -10
C. 5
D. 8

END OF EXAMINATION

Formulae Sheet

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$t_n = a + (n-1)d$$

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

$$S_n = \frac{n}{2}(a + t_n)$$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

Volume of pyramid: $= \frac{1}{3}(\text{Base Area})(h)$

Volume of prism: $= (\text{Base Area})(h)$

Volume of a cylinder: $= \pi r^2 h$

Surface area of a cylinder: $= 2\pi r^2 + 2\pi rh$

Volume of a cone: $= \frac{1}{3}\pi r^2 h$

Surface area of a cone: $= \pi r^2 + \pi rs$

Volume of a sphere: $= \frac{4}{3}\pi r^3$

Surface area of a sphere: $= 4\pi r^2$

NOTE: Use the value of π programmed in your calculator rather than the approximation of 3.14.

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

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Exercise care when tearing along perforations.

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ROUGH WORK FOR GRAPHING

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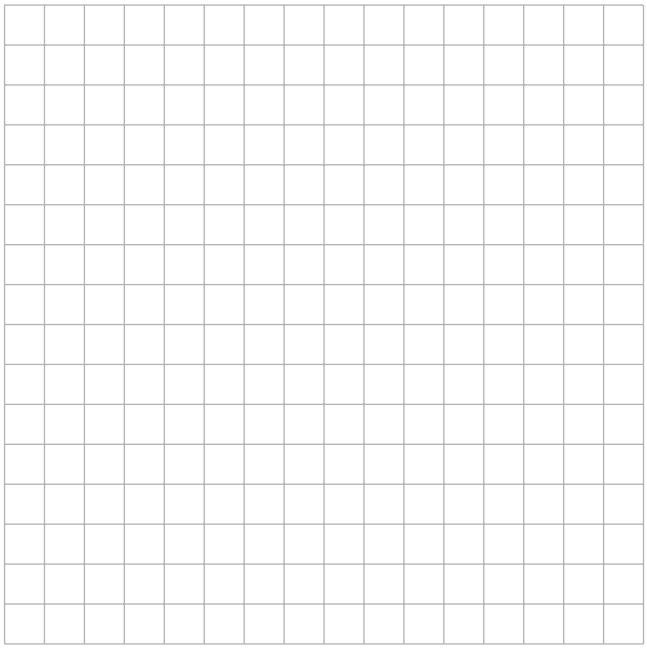

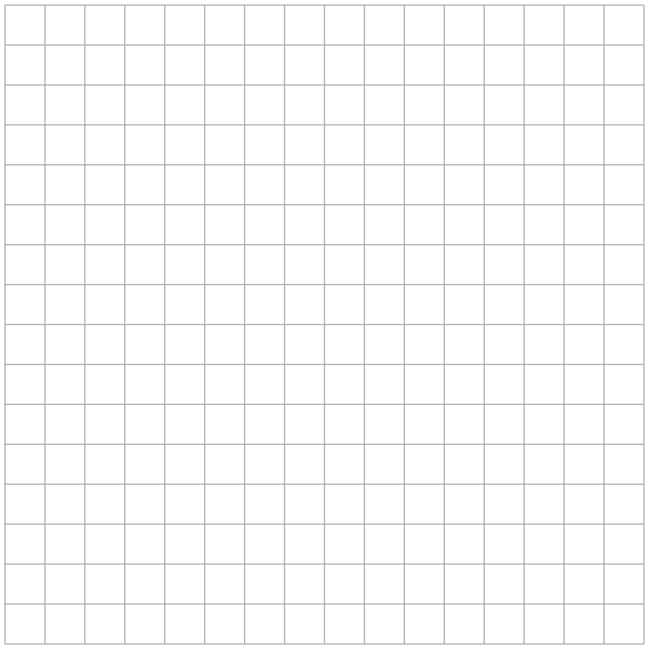

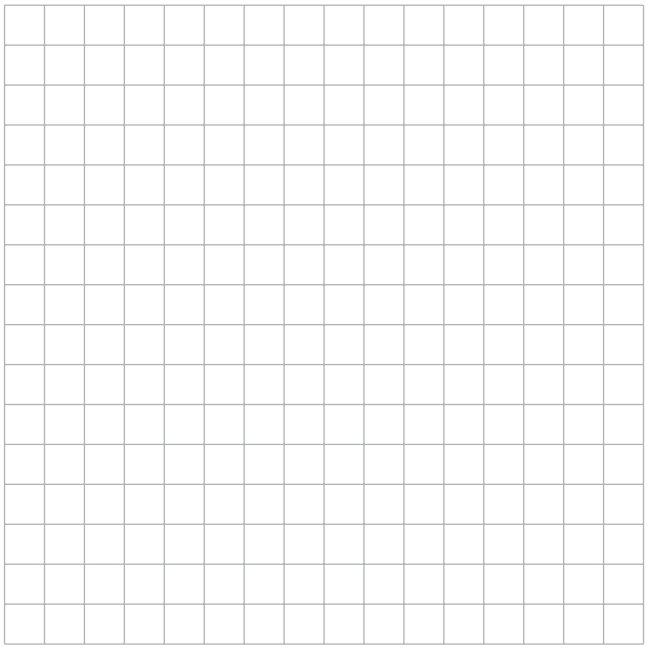

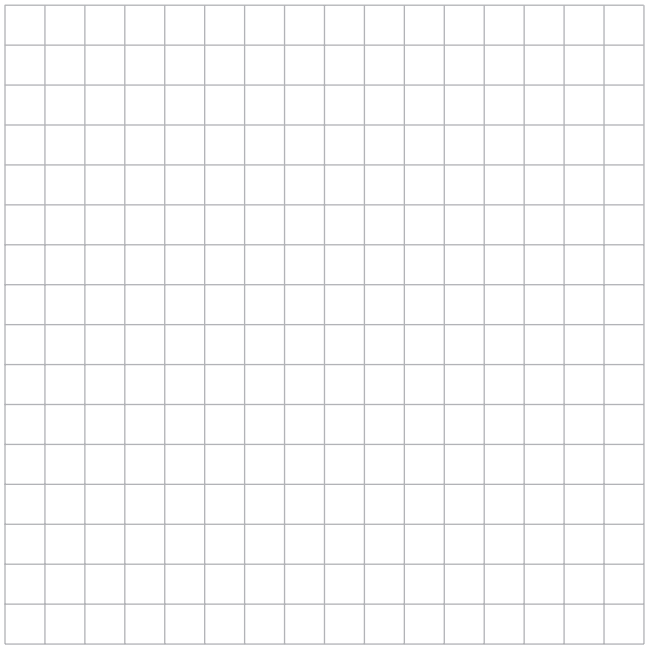

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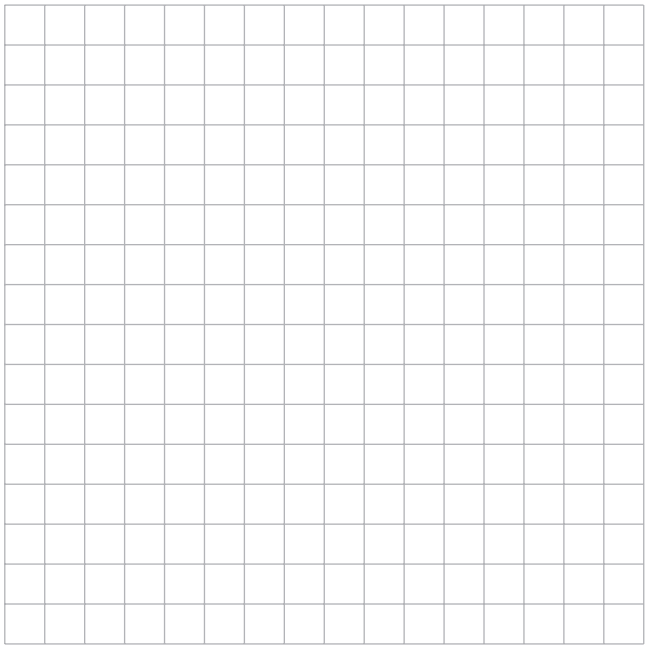
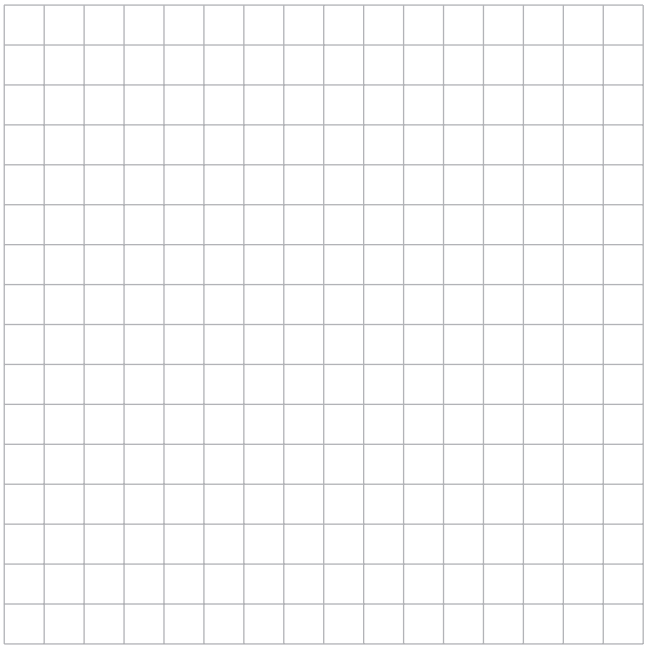
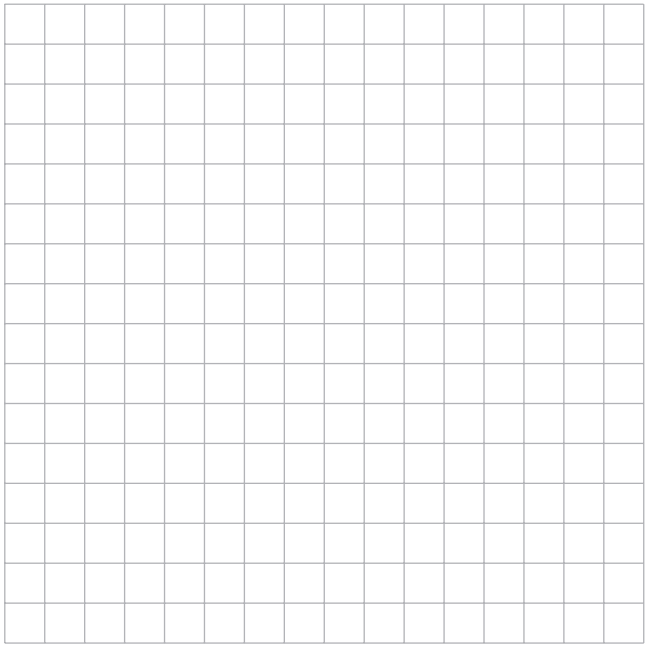
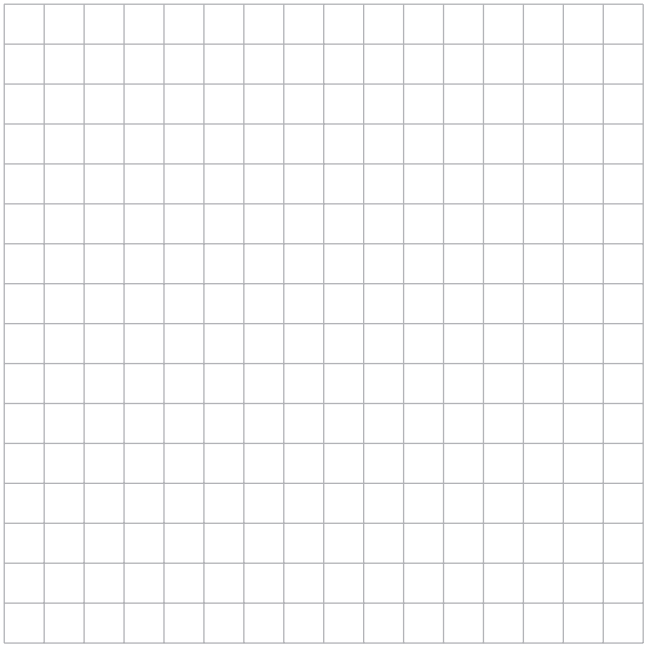
ROUGH WORK FOR GRAPHING

(No marks will be given for work done on this page.)









ROUGH WORK SPACE

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

ROUGH WORK SPACE