



BRITISH  
COLUMBIA

Ministry of Education  
Graduation Program Examination

# Applications of Mathematics 10

## Examination Booklet

### 2005

# Released Exam

**DO NOT OPEN THIS EXAMINATION UNTIL INSTRUCTED TO DO SO.**

### Examination Instructions

1. On your Answer Sheet, fill in the bubble (Form A, B, C, D, E, F, G or H) that corresponds to the letter on this Examination Booklet.
2. Use a pencil to fill in bubbles when answering questions on your Answer Sheet.
3. When answering **Numerical-Response** questions on your Answer Sheet:

- print digits as illustrated:



- shade the circle with the negative symbol if the answer is negative; shade or leave blank the circle with the positive symbol if the answer is positive.
- write your answer in the spaces provided using one digit per box, noting proper place value.
- leave unused boxes blank. For example, the answer  $-70.6$  will be written as shown:



4. When using your calculator:
  - use the programmed value of  $\pi$  rather than the approximation of 3.14.
  - rounding should occur only in the final step of the solution.
5. Read the Examination Rules on the back of this Booklet.

**Contents: 23 pages**

60 multiple-choice/matching/true-false/numerical-response questions  
(maximum of 60 marks)

**Examination: 2 hours**

**Additional Time Permitted: 60 minutes**

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You have **Examination Booklet Form A**. In the box above #1 on your **Answer Sheet**, fill in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	<input checked="" type="radio"/> A	<input type="radio"/> B	<input type="radio"/> C	<input type="radio"/> D	<input type="radio"/> E	<input type="radio"/> F	<input type="radio"/> G	<input type="radio"/> H
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1. Jesse's Art Supplies has 3 small stores and 2 large stores. In April, all 5 stores sold:

Paint	Paper Packs	Brushes
1280	3450	1025

The 2 large stores combined sold the following:

Paint	Paper Packs	Brushes
800	2500	500

Each **small** store, on average, sold 175 brushes.

- A. True
- B. False

**Match each shaded box in the Table on the left with the correct Value on the right.**  
**Each Value may be used once, more than once or not at all.**

Table									Value
									A. \$0.00
									B. \$14.88
									C. \$17.50
									D. \$37.50
									E. \$212.50
									F. \$478.80
									G. \$598.50
									H. \$718.20
Province	PST (%)	Price (\$)	Discount (%)	Discount (\$)	Discount Price (\$)	7% GST (\$)	PST (\$)	Total Paid (\$)	
Yukon	no tax	250.00	15		- 2 -	- 3 -			
Manitoba	7	525.00	20					- 4 -	

5. Mike invested \$1600 with an additional investment each year as shown in the spreadsheet below.

	A	B	C	D	E	F
1	Year	Opening Balance (\$)	Interest Rate (%)	Interest Earned (\$)	Additional Investment (\$)	Closing Balance (\$)
2	1	1600.00	3.25	52.00	700.00	2352.00
3	2	2352.00	3.75	88.20	1000.00	3440.20
4	3		4.50			
5	4	4245.01				

What additional investment in Year 3 will give the indicated opening balance of Year 4?  
 Answer in dollars and cents.

**Record your answer on the Answer Sheet.**

6. The table below shows the average hours of TV viewing per week.

**Average Hours Per Week of Television Viewing**

Region	12–17 Year Olds
<b>Canada</b>	<b>13.1</b>
Newfoundland and Labrador	15.8
Prince Edward Island	12.4
Nova Scotia	14.1
New Brunswick	14.1
Quebec	14.5
Ontario	12.8
Manitoba	12.8
Saskatchewan	12.5
Alberta	13.3
British Columbia	10.9

Which of the provinces below has more average hours of television viewing than the Canadian average?

- A. Alberta
- B. Ontario
- C. British Columbia
- D. Prince Edward Island

7. The following table represents a mattress store’s sales and prices.

Type of Mattress	Number Sold	Price of Each Item
Single	200	\$129.00
Twin	346	\$345.00
Queen	562	\$675.00
King	175	\$820.00

If the store lowers the price of each Queen mattress by \$25.00, they can sell 150 more Queen mattresses. What would be the store’s **total** revenue if every mattress in the store is sold?

- A. \$462 800
- B. \$577 070
- C. \$668 020
- D. \$751 470

Use the following tables to answer question 8.

A monthly budget in Canadian dollars				
Housing	Food	Transportation	Utilities	Entertainment
\$850	\$320	\$460	\$150	\$250

Exchange rates for \$1 Canadian				
	US (\$)	AUS (\$)	EUR (€)	GBP (£)
\$1 CAD	0.7279	1.1028	0.6442	0.4482

8. What is the cost of food in Euros (€)?

- A. 206.14
- B. 232.93
- C. 439.62
- D. 496.74

9. An employee's annual salary over 4 years is shown below.

Year	Starting Salary (\$)	Rate of Increase (%)	Pay Increase (\$)	Year-End Salary (\$)
1	35 000.00	5.0	1750.00	36 750.00
2	36 750.00	4.8	1764.00	38 514.00
3	38 514.00	6.0	2310.84	40 824.84
4	40 824.84	5.8	2367.84	43 192.68

In which year does the employee receive the greatest increase in their Year-End Salary?

- A. Year 1
- B. Year 2
- C. Year 3
- D. Year 4

10. A spreadsheet was created to track an investment.

	A	B	C	D	E	F
<b>1</b>	<b>Year</b>	<b>Opening Balance (\$)</b>	<b>Annual Interest Rate (%)</b>	<b>Interest Earned (\$)</b>	<b>Annual Investment (\$)</b>	<b>Closing Balance (\$)</b>
<b>2</b>	1	5000.00	5.5		0.00	
<b>3</b>	2		6.0		3000.00	

What is the closing balance for Year 2?

- A. \$2591.50
- B. \$5275.00
- C. \$5591.50
- D. \$8591.50

11. A store's price list is given below.

Item	Cost per Item
Candles	\$1.25
Soap Holders	\$3.50
Picture Frames	\$9.85

If a customer buys 15 of each item, what is the total cost? Answer in dollars and cents.

**Record your answer on the Answer Sheet.**

12. The following spreadsheet is used to track a loan.

	A	B	C	D	E	F
1	Year	Opening Balance (\$)	Interest Rate (%)	Interest Charged (\$)	Annual Payment (\$)	Closing Balance (\$)
2	1	7000.00	8.5	595.00	1000.00	6595.00
3	2	6595.00	8.5	560.58	1000.00	
4	3		8.5			

Which spreadsheet formula would calculate the closing balance of the loan in Year 3?

- A. = B4 + D4 + E4
- B. = B4 + D4 - E4
- C. = B3 + D3 + E3
- D. = B3 + D3 - E3

13. The following spreadsheet represents the repayment of a \$23 500 loan.

	A	B	C	D	E	F
1	Year	Opening Balance (\$)	Interest Rate (%)	Interest Charged (\$)	Annual Payment (\$)	Closing Balance (\$)
2	1	23 500.00	6.4	1504.00	2000.00	23 004.00
3	2	23 004.00	6.4	1472.26	2000.00	22 476.26
4	3	22 476.26	6.4	1438.48	2000.00	
5	4					

If the annual payment is doubled in Year 10, which formula would calculate the closing balance in Year 10?

- A. = B10 + 2 \* D10 – E10
- B. = B10 + D10 – 2 \* E10
- C. = B11 + 2 \* D11 – E11
- D. = B11 + D11 – 2 \* E11

14. Josh is paid \$8.50/h at his part-time job. For any hours in a week he works over 40 h, he receives double-time. Which formula would determine his weekly pay if he works 46 h in a week?

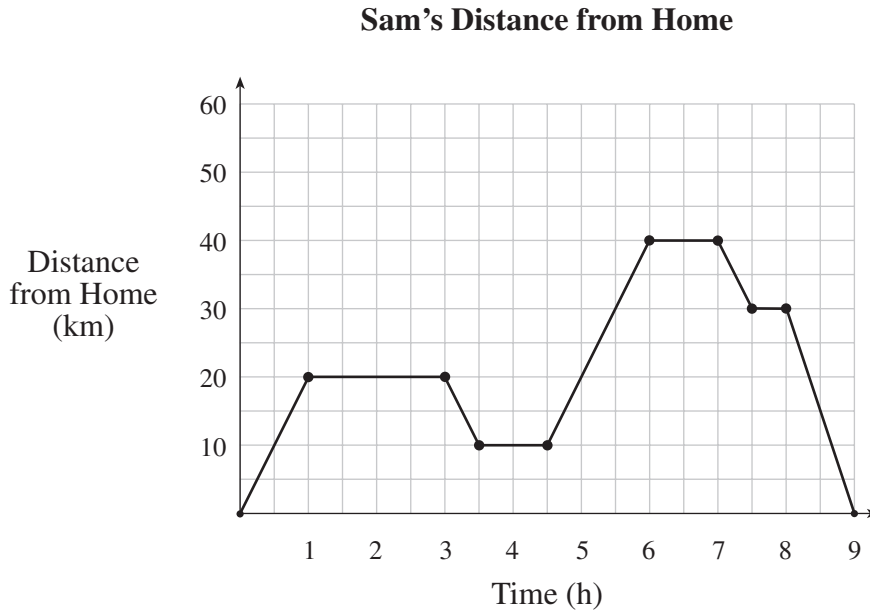
- A.  $46 \times 8.50$
- B.  $46 \times 17.00$
- C.  $(40 \times 8.50) + (6 \times 17.00)$
- D.  $(40 \times 8.50) + (46 \times 17.00)$

15. If a cube has a surface area of  $18 \text{ m}^2$ , what is the length of one side?

- A. 1.73 m
- B. 2.62 m
- C. 4.24 m
- D. 6.00 m



16. The following graph represents Sam's distance away from home during the day.



The longest distance Sam travels at one time, without stopping, is 40 km.

- A. True  
B. False
17. The equation representing a football's path over time when thrown in the air is  $h = -4.9t^2 + 9t + 3$ , where  $h$  is the football's height in metres and  $t$  is time in seconds. Which window settings below would be most appropriate for this situation?
- A.  $x \text{ min} = -10$      $y \text{ min} = -577$   
 $x \text{ max} = 10$      $y \text{ max} = 7.11$
- B.  $x \text{ min} = -10$      $y \text{ min} = -10$   
 $x \text{ max} = 10$      $y \text{ max} = 10$
- C.  $x \text{ min} = 0$      $y \text{ min} = 0$   
 $x \text{ max} = 3$      $y \text{ max} = 10$
- D.  $x \text{ min} = 0$      $y \text{ min} = 0$   
 $x \text{ max} = 10$      $y \text{ max} = 3$

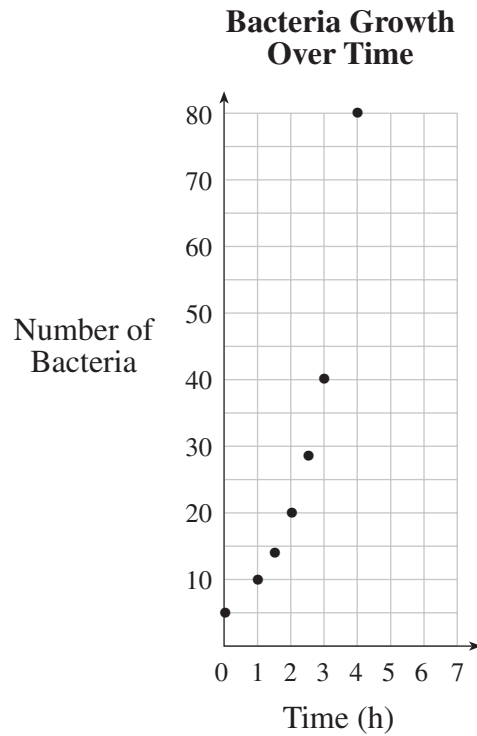
18. Which equation would best represent the relationship between  $x$  and  $y$  in the table of values below?

$x$	-2	-3	2	3
$y$	8	10	0	-2

- A.  $y = -4x$   
B.  $y = -2x + 4$   
C.  $x - 1 = y + 2$   
D.  $x + 1 = y - 2$
19. If a school hosts a dance, the profit  $P$  is represented by the function  $P(n) = 4n - 75$ , where  $n$  is the number of tickets sold. What is the value of  $P(100)$ ? Answer to the nearest dollar.

**Record your answer on the Answer Sheet.**

20. The following graph represents the growth of bacteria over time.



What is the range of the graph?

- A.  $\{0, 1, 1.5, 2, 2.5, 3, 4\}$
  - B.  $\{5, 10, 14, 20, 28, 40, 80\}$
  - C.  $\{5, 10, 15, 20, 30, 40, 80\}$
  - D.  $\{0, 10, 20, 30, 40, 50, 60, 70, 80\}$
21. The number of litres of gas,  $G$ , remaining in the tank of a car depends on the distance travelled,  $d$ , in kilometres:

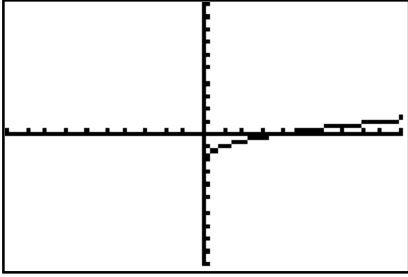
$$G = 72 - 0.09d$$

How far will the car travel before it runs out of gas?

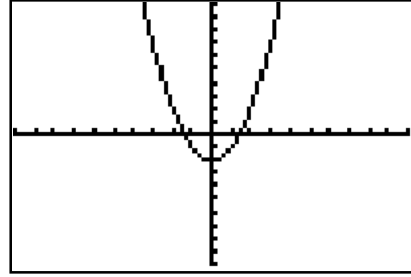
- A. 71.91 km
- B. 72 km
- C. 648 km
- D. 800 km

22. Which graph represents the function  $y = \sqrt{x-2}$ ?

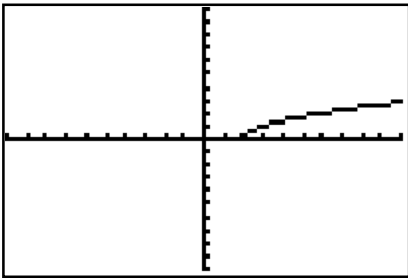
A.



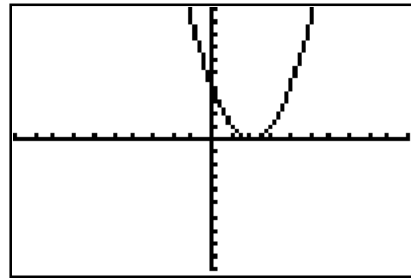
B.



C.

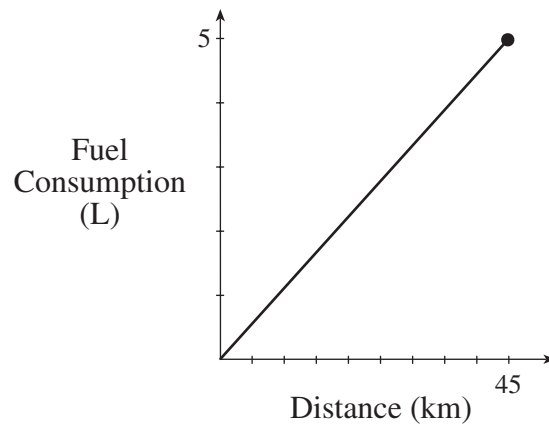


D.



23. The following graph represents the amount of fuel used by a truck.

**Fuel Consumption of a Truck**

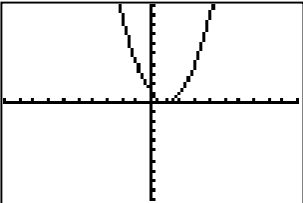
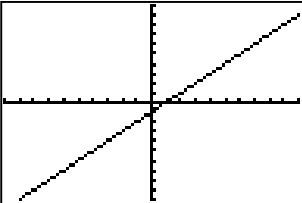


Using the graph above, which of the statements are true?

I.	The domain is all numbers from 0 to 45.
II.	The domain is all numbers from 0 to 5.
III.	The range is all numbers from 0 to 45.
IV.	The range is all numbers from 0 to 5.

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

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

Function	Representation								
24. $y = 6x + 2$	A. 2 more than 6 times a number								
25. $y = (x - 1)^2$	E. 2 less than 6 times a number								
26. $y = 2x - 6$	F. 6 more than double a number								
	B. <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><math>x</math></td><td><math>y</math></td></tr> <tr><td>1</td><td>0</td></tr> <tr><td>5</td><td>16</td></tr> <tr><td>2</td><td>2</td></tr> </table>	$x$	$y$	1	0	5	16	2	2
$x$	$y$								
1	0								
5	16								
2	2								
	C. <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><math>x</math></td><td><math>y</math></td></tr> <tr><td>0</td><td>-1</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>-4</td><td>15</td></tr> </table>	$x$	$y$	0	-1	1	1	-4	15
$x$	$y$								
0	-1								
1	1								
-4	15								
	G. <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td><math>x</math></td><td><math>y</math></td></tr> <tr><td>5</td><td>4</td></tr> <tr><td>1</td><td>-4</td></tr> <tr><td>-2</td><td>-10</td></tr> </table>	$x$	$y$	5	4	1	-4	-2	-10
$x$	$y$								
5	4								
1	-4								
-2	-10								
	D. 								
	H. 								

27. A house in Coquitlam was purchased for \$310 000 and increases in value at a rate of \$25 000 per year. The equation  $C(t) = 310\,000 + 25\,000t$  represents the value of the house,  $C$ , in dollars, over time,  $t$ , in years.

What is the value of  $t$  when  $C(t) = 485\,000$ ? Answer to the nearest year.

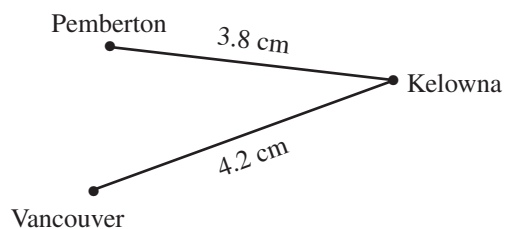
**Record your answer on the Answer Sheet.**

28. A sandwich shop's profit,  $P$ , is represented by the function  $P = 6n - 180$ , where  $n$  is the number of sandwiches sold. What is the slope of the function?
- A. 6
  - B. 30
  - C. 180
  - D. -180
29. The thickness of a wall depends on how tall a building is. The equation to determine the thickness of a building's walls,  $t$  in cm, is  $t = 10 + 0.06h$ , where  $h$  is the building's height in m. If a building's walls are 14.2 cm thick, how tall is the building?
- A. 10.85 m
  - B. 70 m
  - C. 226.67 m
  - D. 403.33 m
30. Prince Rupert Cabs charges customers an initial fee plus a charge per kilometre travelled. If a customer is charged \$25.65 for a 16 km trip and \$45.95 for a 30 km trip, what is the charge per kilometre travelled?
- A. \$1.45
  - B. \$1.53
  - C. \$1.60
  - D. \$2.45

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

Statement	Measurement (Rounded to one decimal place)
31. Amount of material needed to cover a soccer ball of radius 19.4 cm	A. 10.5
32. The radius of a volleyball with a volume of 4849.0 cm <sup>3</sup>	B. 11.0
33. The <b>diameter</b> of a bowling ball with a surface area of 1520.5 cm <sup>2</sup>	C. 14.3
	D. 19.6
	E. 22.0
	F. 1 256.6
	G. 4 729.5
	H. 30 584.0

34. On a map of BC, the shortest distance from Vancouver to Kelowna measures 4.2 cm. The shortest distance from Kelowna to Pemberton measures 3.8 cm.



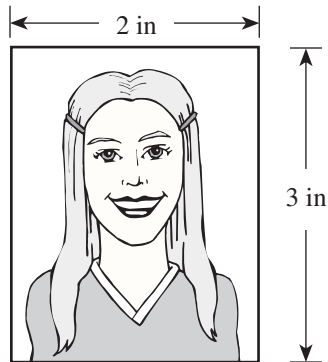
Scale: 1 cm = 5 000 000 cm

What is the total **actual** shortest distance from Vancouver to Kelowna to Pemberton?  
Answer to the nearest **kilometre**.

**Record your answer on the Answer Sheet.**

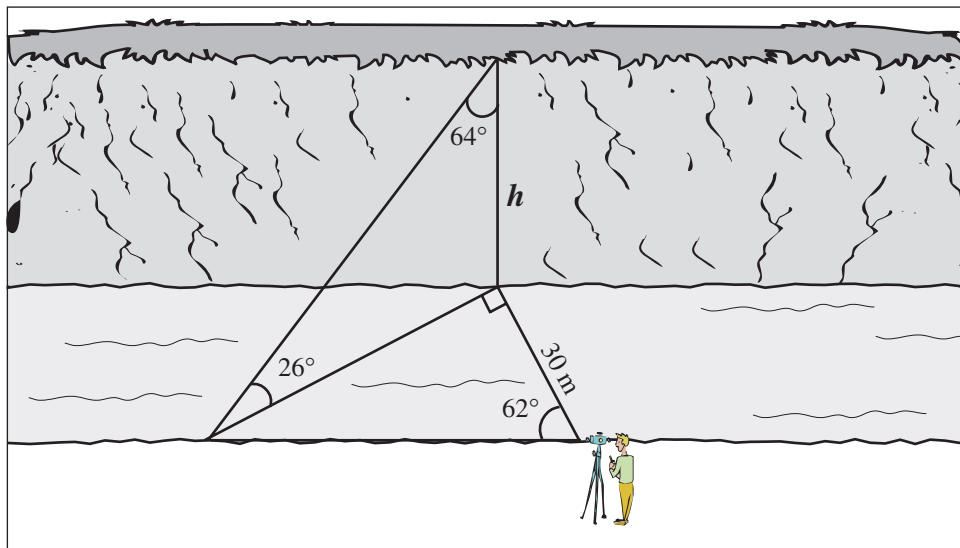


35. The Yearbook Club decides to increase the size of photos in the yearbook. The original pictures each have an area of  $6 \text{ in}^2$ .



If each dimension is doubled, what is the area of the new photograph?

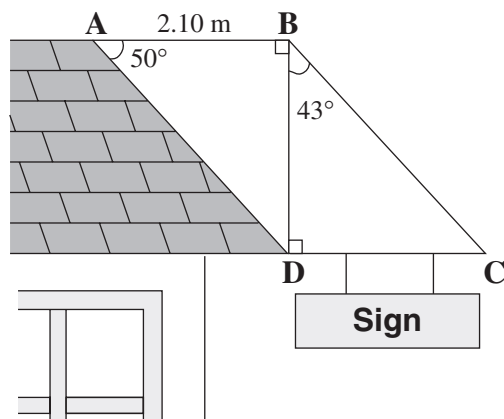
- A.  $3 \text{ in}^2$
  - B.  $12 \text{ in}^2$
  - C.  $24 \text{ in}^2$
  - D.  $36 \text{ in}^2$
36. On the following diagram,  $h$  represents the height of the cliff.



Find the height of the cliff.

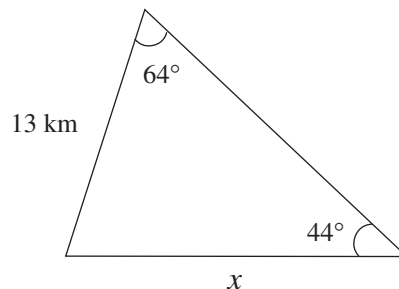
- A. 27.52 m
- B. 31.17 m
- C. 32.71 m
- D. 56.42 m

37. In order to hang a sign horizontally from the side of a roof, a special bracket must be made. The bracket is constructed from two right triangles,  $\triangle ABD$  and  $\triangle BCD$ , as shown below.



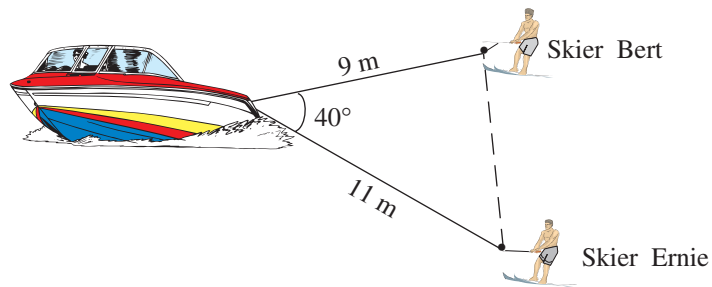
If bracket piece AB is 2.10 m long, how long, in metres, must bracket piece BC be?

- A. 1.83 m
  - B. 2.10 m
  - C. 2.50 m
  - D. 3.42 m
38. What value(s) of  $A$  will give  $\sin A = 0.8660$  where  $A$  is between  $0^\circ$  and  $180^\circ$ ?
- A.  $30^\circ$
  - B.  $60^\circ$
  - C.  $30^\circ, 150^\circ$
  - D.  $60^\circ, 120^\circ$
39. Which method would you use to find side  $x$ ?



- A. Sine Law
- B. Cosine Law
- C. Tangent Law
- D. Pythagorean Theorem

40. A boat is towing two water skiers, Bert and Ernie. Bert's towrope is 9 m long and Ernie's towrope is 11 m long. The angle between the towropes is  $40^\circ$ .



How far apart, in metres, are Bert and Ernie? Answer to two decimal places.

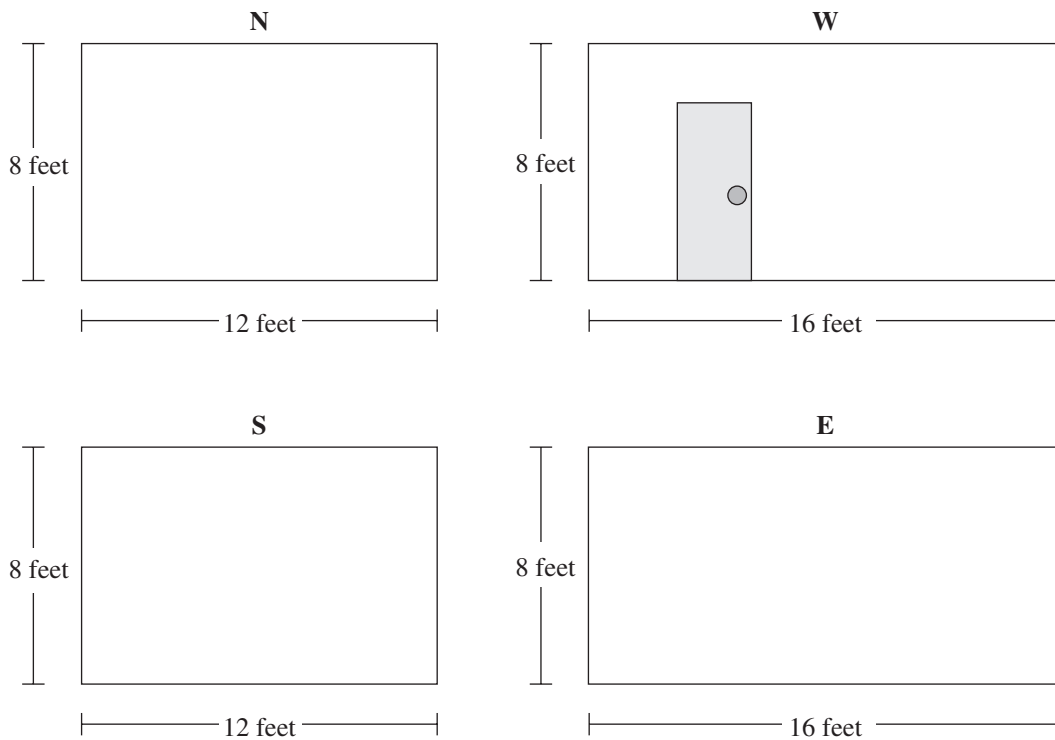
**Record your answer on the Answer Sheet.**

41. If the dimensions of a cube are doubled, the perimeter of one face is increased by a factor of 4.
- A. Always True
  - B. Sometimes True
  - C. Never True
42. Which instrument would best measure the inside diameter of a pipe?
- A. ruler
  - B. micrometer
  - C. tape measure
  - D. vernier caliper
43. A desk has a width of 25.2 cm when measured with a ruler. What is the precision of this ruler?
- A. 0.01 cm
  - B. 0.05 cm
  - C. 0.1 cm
  - D. 0.5 cm

44. A school bus is travelling at a rate of 50 km/h. What is the speed of the bus in **meters per second**?

- A. 3.0
- B. 13.9
- C. 180.0
- D. 833.0

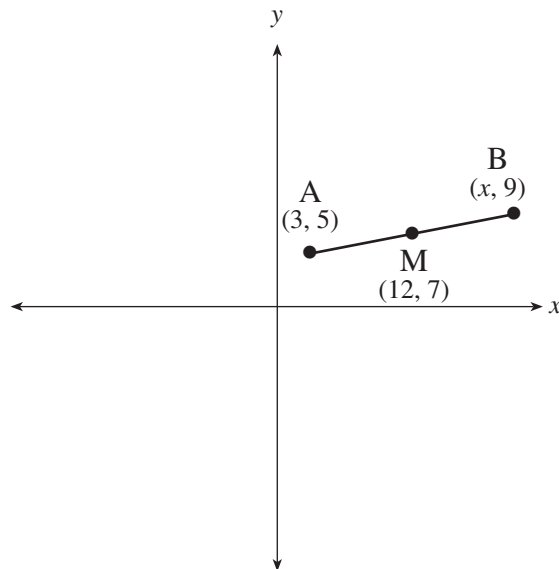
45. Four walls of a room are shown below. The room is to be wallpapered. There is one door 6 feet high and 2.5 feet wide that will not be wallpapered.



What is the total area to be wallpapered, in square feet?

- A. 384
- B. 433
- C. 448
- D. 463

46. A city is built on a grid pattern. Buildings are located at  $A(-6, 5)$  and  $B(12, -2)$ . What is the shortest distance between the two buildings?
- A. 6.7 units  
B. 9.2 units  
C. 14.9 units  
D. 19.3 units
47. A ship is 80 km from a dock. The ship is sailing toward the dock at a speed of 5 km/h. Which equation represents the ship's distance,  $D$  in kilometers, from the dock over time,  $t$  in hours?
- A.  $D = -5t + 80$   
B.  $D = 5t + 80$   
C.  $D = 80t - 5$   
D.  $D = 80t + 5$
48. If  $M$  is the midpoint of line segment  $AB$  below, what is the length of  $AB$ ? Answer to two decimal places.



**Record your answer on the Answer Sheet.**

49. A ferry terminal is at the midpoint between Vancouver and Prince Rupert. The coordinates of Vancouver are  $(21, 15)$  and the coordinates of the ferry terminal are  $(-3, 89)$ . What are the coordinates of Prince Rupert?

- A.  $(9, 52)$
- B.  $(-12, 38)$
- C.  $(45, -59)$
- D.  $(-27, 163)$

50. What is the slope of a line parallel to  $y = 3x + 2$ ?

- A. 3
- B. -3
- C.  $-\frac{1}{3}$
- D.  $\frac{1}{3}$

51. A telephone survey was conducted in order to establish the level of community support for the construction of a leisure centre.

- 60 randomly selected phone numbers were called between 10:00 a.m. and 1:30 p.m. on one weekday.
- 19-year olds or older were asked the question “Do you support the construction of a leisure centre in your community?”
- 40 respondents said “Yes.”

Which of the following would be reasonable conclusions from the survey?

I.	The majority of those sampled were in favour of the construction.
II.	The time of day in which the sample was taken would bias the sample.
III.	The city should proceed with the construction.

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

52. A courier determines their shipping charges based on the weight of a package. A 40 kg package will cost \$245 to ship and a 90 kg package will cost \$372. How much will it cost to ship a 115 kg package?
- A. \$143.40  
 B. \$274.53  
 C. \$435.50  
 D. \$704.38
53. A line that passes through the points  $(5, 4)$  and  $(0, -24)$  has a slope of  $-4$ .
- A. True  
 B. False

**Match each Description on the left with the correct Sampling Method on the right.  
 Each Sampling Method may be used once, more than once or not at all.**

Description	Sampling Method
54. Students volunteer for a survey.	A. cluster sample
55. Of the Grade 10 population in a school, all boys are surveyed.	B. systematic sample
56. A customs agent inspects every 3rd piece of luggage.	C. convenience sample
	D. self-selected sample
	E. simple random sample
	F. stratified random sample

57. A plane's height was measured at several points during take-off.

<b>Time (s)</b>	15	25	45
<b>Height (m)</b>	840	1400	2520

Using linear regression, what is the plane's height at 16 s? Answer to the nearest metre.

**Record your answer on the Answer Sheet.**

58. Which of the following slopes best matches the slope of a line segment perpendicular to the  $x$ -axis?

- A.  $-1$
- B.  $0$
- C.  $1$
- D. undefined

59. Tia recorded the number of bacteria over time as shown in the table below.

<b>Time (h)</b>	1	2.2	3.1	4.4	5.6
<b>Number of Bacteria</b>	500	240	130	70	30

If the correlation coefficient  $r$  is  $-0.92$ , what should Tia conclude?

- A. There is a strong relationship between time and the number of bacteria.
- B. There is a weak relationship between time and the number of bacteria.
- C. There is no relationship between time and the number of bacteria.
- D. The relationship between time and the number of bacteria cannot be determined.



60. A comparison between the list price of several vehicles and their stopping distances, in feet, from 60 to 0 mph was made as shown in the table below.

Vehicle	List Price US \$	Stopping Distance (feet)
Acura NSX	89 000	117
Audi A4	32 090	125
Chrysler PT Cruiser	15 450	131
Honda Civic Si	19 000	133
Hyundai Tiburon	17 999	154
Mazda MX-5 Miata	23 995	150
Mini Cooper S	18 000	143

What is the correlation coefficient,  $r$ , for the data?

- A. 146.7
- B. 0.45
- C. -0.00034
- D. -0.67

You have **Examination Booklet Form A**. In the box above #1 on your **Answer Sheet**, ensure you filled in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A	B	C	D	E	F	G	H
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**END OF EXAMINATION**

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## Examination Rules

1. The time allotted for this examination is two hours.  
You may, however, take up to 60 minutes of additional time to finish.
2. Answers entered in this Booklet will not be marked.
3. Cheating on an examination will result in a mark of zero. The Ministry of Education considers cheating to have occurred if a student breaks any of the following rules:
  - Candidates must not give or receive assistance of any kind in answering an examination question during an examination, including allowing one's paper to be viewed by others or copying answers from another student's paper.
  - Candidates must not possess any book, paper or item that might assist in writing an examination, including a dictionary or piece of electronic equipment, that is not specifically authorized for the examination by ministry policy.
  - Candidates must immediately follow the invigilator's order to stop writing at the end of the examination time and must not alter an Examination Booklet, Response Booklet or Answer Sheet after the invigilator has asked students to hand in examination papers.
  - Candidates must not communicate with another student during the examination.
  - Candidates must not remove any piece of the examination materials from the examination room, including work pages.
  - Candidates must not take or knowingly use any secure examination materials prior to the examination session.
4. The use of inappropriate language or content may result in a mark of zero being awarded.
5. Upon completion of the examination, return all examination materials to the supervising invigilator.