

Grade 9 Mathematics Online Practice Test - 1999

(Adapted from the 1999 Grade 9 Mathematics Achievement Test)

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This test has two sections:

- one section has 44 multiple-choice questions, each with a value of one mark
- the other section has 6 numerical response questions, each with a value of one mark

The sections may be done in whatever order you choose.

This test is designed to be completed in 90 minutes; however, you may have an additional 30 minutes to complete the test, if you need it.

Instructions

- Read each question carefully.
- You are expected to provide your own scientific calculator.
- Be sure that your calculator is in degree (DEG) mode.
- Manipulatives may be used for this test.
- Try to answer all the questions. If you cannot answer a question, go on to the next one. Click on the "Score Test!" button on the last page to get your score.

Multiple Choice

- Each question has four possible answers from which you are to choose the **correct** or **best** answer.
- Locate the circle next to the letter that corresponds to your choice and click on it with your mouse's left button. The circle will fill in. In order to change your answer, click on a different circle. Try the example below.

Example

This examination is for the subject of

- A. mathematics
- B. science
- C. language arts
- D. social studies

Numerical Response

- Record your answer in the numerical-response box next to the question.

Example

Evaluate 3^5 .

$$3^5 = 3 \times 3 \times 3 \times 3 \times 3 = 243$$

Answer: 243

Record 243 in the answer box:

243

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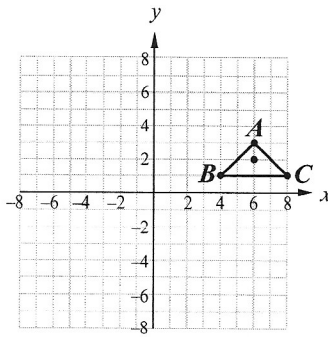
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Connections within Mathematics

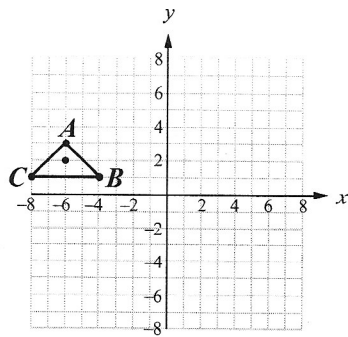
Use the following information to answer question 1.

A triangular shape is displayed on a computer, as shown below. This triangular shape rotates around the point shown within the triangle.

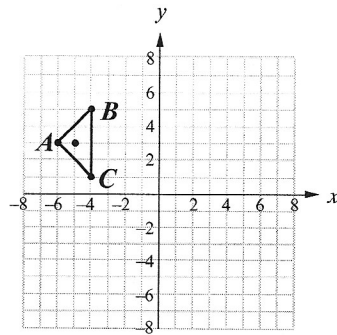


1. Which of the following diagrams represents a 180° rotation of the triangular shape shown above?

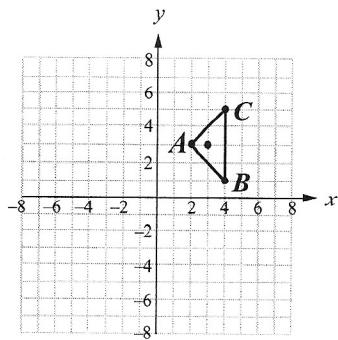
A.



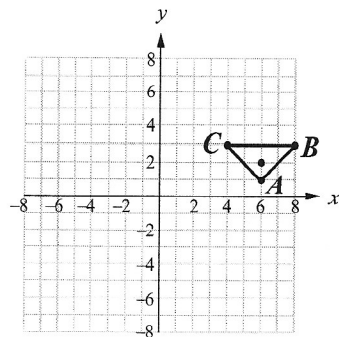
B.



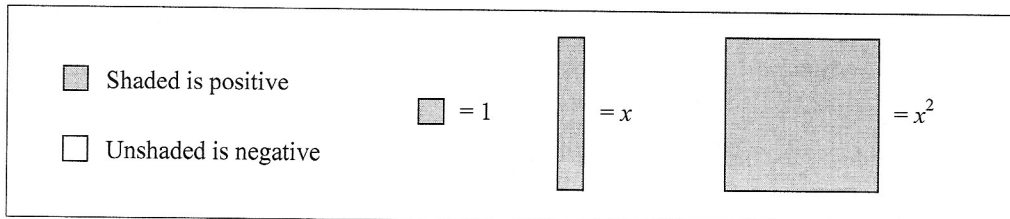
C.



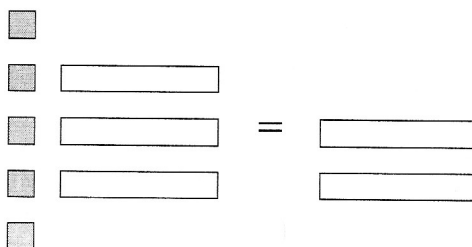
D.



Use the following algebra-tiles legend when answering questions 2 to 4.



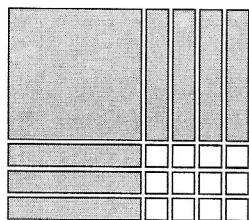
2. What equation is represented by the diagram below?



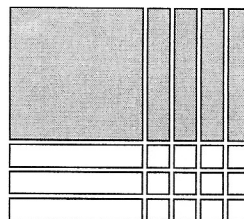
- A. $-5 + 3x = 2x$
- B. $5 - 3x = -2x$
- C. $-5 - 3x = -2x$
- D. $5 + 3x = -2x$

3. Which of the following area diagrams represents the product of $(x + 3)(x - 4)$?

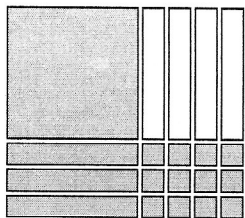
A.



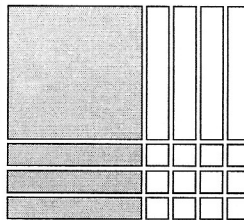
B.



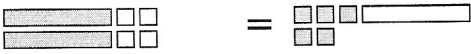
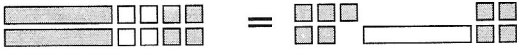
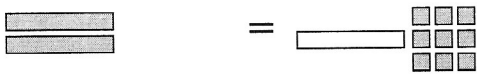
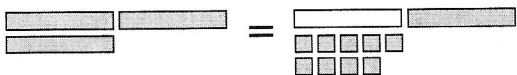


C.



D.



Use the following additional information to answer question 4.

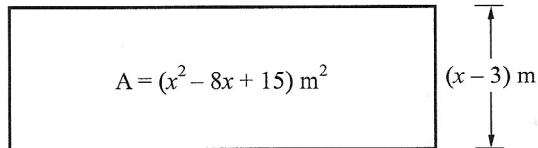
Angie's and Joe's math teacher asked them to solve the equation $2x - 4 = 5 - x$. Angie used algebra tiles, and Joe used symbols.		
Steps	Angie	Joe
1. Add 4 to both sides		$2x - 4 = 5 - x$
		$2x - 4 + 4 = 5 - x + 4$
2. Simplify		$2x = 9 - x$
3. Add x to both sides		$2x + x = 9 - x + x$
4. Simplify		$x = 9$
5. Sharing Principle		

4. A mistake was made by

- A. Joe in step 1
- B. Angie in step 1
- C. Joe in step 3
- D. Angie in step 3

Use the following information to answer question 5.

A home builder is installing carpet in a new home. The area in square metres of the living room can be expressed as $x^2 - 8x + 15$.



5. If the width, in metres, of the living room is represented by $(x - 3)$, then the length, in metres, of the living room is represented by

- A. $(x - 5)$
- B. $(x + 5)$
- C. $(7x - 5)$
- D. $(-7x + 5)$

6. If $x^2 = 64$, then x equals

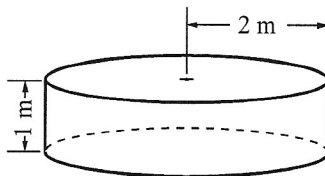
- A. 32 or -32
- B. 8 or -8
- C. 8 only
- D. 32 only

7. If $2x + 23 = -7 + 8x$, then x equals

- A. 5
- B. 3
- C. -3
- D. -5

Use the following information to answer question 8.

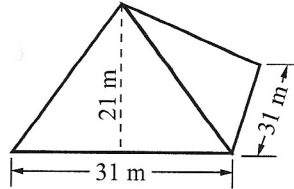
At the end of the day, Pat relaxes in a hot tub that is the shape of a cylinder. The hot tub has a radius of 2 m and depth of 1 m. The formula for the volume of a cylinder is $V = \pi r^2 h$.



8. If the radius of the tub is doubled, then the volume will be
- A. halved
 - B. doubled
 - C. increased four times
 - D. increased eight times
-
9. Which of the following transformations does **not** maintain congruency between the object and its image?
- A. Reflection
 - B. Rotation
 - C. Translation
 - D. Dilatation
10. The formula $V = \frac{1}{3} \pi r^2 h$ is used to determine the volume of a cone-shaped paper cup. To what set of numbers does π belong?
- A. Natural numbers
 - B. Irrational numbers
 - C. Rational numbers
 - D. Imaginary numbers

Use the following information to answer question 11.

A square-based pyramid in northern Egypt has a base width of 31 m and a face height of 21 m.



11. The total surface area of the 4 exposed faces of this pyramid is

- A. 2 604.0 m²
 - B. 1 302.0 m²
 - C. 651.0 m²
 - D. 325.5 m²
-

12. Alex runs on a treadmill and consumes about 5×10^5 joules (J) of energy every 15 minutes. At this rate of energy consumption, if Alex runs for $1\frac{3}{4}$ hours, the amount of energy he uses, expressed in **scientific notation**, is approximately

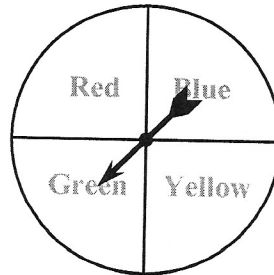
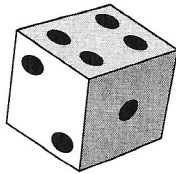
- A. 3.5×10^6 J
- B. 35×10^5 J
- C. 8.75×10^5 J
- D. 87.5×10^4 J

13. To determine lane position in a race, 8 runners put their names in a hat. There are 3 runners from the same team. What is the probability that the first name pulled from the hat will be that of a runner from this team?

- A. $\frac{1}{3}$
- B. $\frac{1}{8}$
- C. $\frac{5}{8}$
- D. $\frac{3}{8}$

Use the following information to answer question 14.

Anne is playing a game with a die that has a different number on each face and a spinner that has 4 colours.



14. What is the probability that Anne will roll a four and that the spinner will stop on green?

- A. $\frac{1}{10}$
- B. $\frac{2}{10}$
- C. $\frac{1}{24}$
- D. $\frac{2}{24}$

15. One of Joe's drawers contains ten identical red socks and ten identical blue socks. If Joe does not look in the drawer, what is the least number of socks he must remove from the drawer before he is certain of getting a matched pair?

- A. 2
- B. 3
- C. 10
- D. 11

16. What is the value of $\frac{(-2)^7}{4^0}$?

- A. +128
- B. -128
- C. 0
- D. Undefined

17. The expression $9x^2y^2 \div (-3xy)$ is equivalent to

- A. $-3x^2y$
- B. $3xy^2$
- C. $3xy$
- D. $-3xy$

18. You are asked to conduct a survey to determine the favourite sport of people attending a co-ed camp. Which of the following samples is **least** biased?

- A. A sample of all campers
- B. A sample of all of the boys at camp
- C. A sample of the camp football team
- D. A sample of spectators at a camp soccer game

Mathematics of Farming

Farmers use math everyday. The following questions show ways in which farmers may use math in their daily work.

Use the following information to answer question 19.

A high school student makes a work arrangement with his father. In return for unlimited use of a truck for one year, he agrees to pay the following estimated yearly truck expenses.

• Insurance	\$556.40
• Gasoline	\$1 040.40
• Repairs	\$800.00
• Maintenance	\$200.00

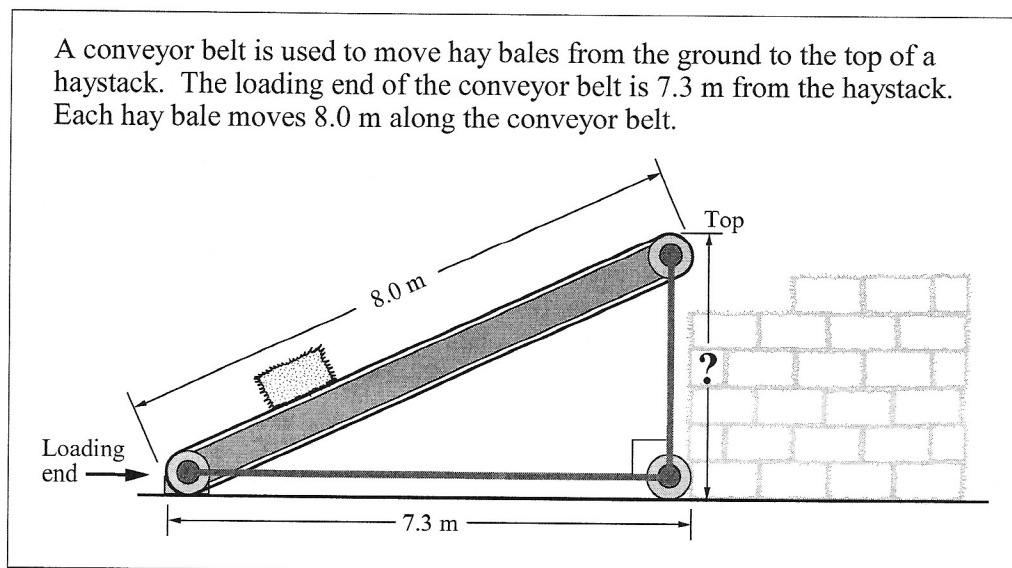
The student also wishes to earn \$2 000.00 above these truck expenses.

19. The student works 8 hours a week for 52 weeks on the farm. What is the **lowest** hourly wage he must earn in order to pay these truck expenses for one year and also save \$2 000.00?

- A. \$6.25/h
 B. \$10.50/h
 C. \$11.05/h
 D. \$12.50/h

Use the following information to answer question 20.

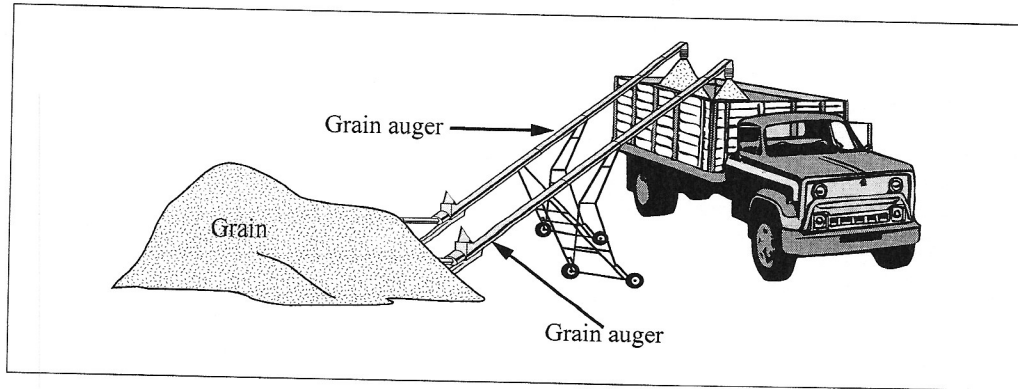
A conveyor belt is used to move hay bales from the ground to the top of a haystack. The loading end of the conveyor belt is 7.3 m from the haystack. Each hay bale moves 8.0 m along the conveyor belt.



20. What is the height to the top of the conveyor belt?

- A. 2.6 m
- B. 3.3 m
- C. 6.8 m
- D. 10.7 m

Use the following picture to answer question 21.



21. At the farm, two augers are being used to fill a truck with grain. One auger alone can fill the truck in 15 minutes. The other auger alone can fill the truck in 10 minutes. How long will it take the two augers together to fill the truck?

- A. 5.5 min
 B. 6.0 min
 C. 12.5 min
 D. 25.0 min

22. A surveyor's report states that a field being planted measures 302 m by 604 m. A farmer spreads seed at a rate of 2.7 kg for every 100 m². Given that 1 t = 1 000 kg, approximately how many tonnes (t) of seed are needed to plant the entire field?

- A. 5 t
 B. 25 t
 C. 65 t
 D. 651 t

Use the following information to answer question 23.

A farmer hires a worker. Each week, the worker works 9 h at a rate of \$5.60/h. From each weekly paycheck, the worker must pay

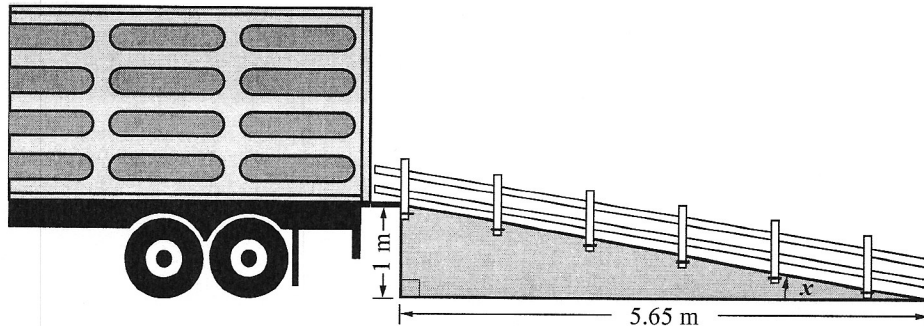
- 1% of the total pay for disability insurance
- 2.2% of the total pay for employment insurance
- 15% of the total pay for income tax and Canada Pension

23. What are the worker's weekly earnings after these deductions are made?

- A. \$50.40
- B. \$41.48
- C. \$41.23
- D. \$32.20

Use the following diagram to answer question 24.

The farmer builds a ramp to load cattle into a truck. The truck deck is 1 m above the ground, and the base of the ramp is 5.65 m long.



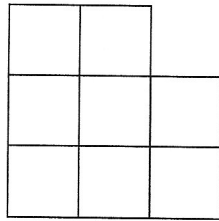
24. What is the angle of inclination (x) of the ramp?

- A. 10.0°
- B. 17.0°
- C. 27.0°
- D. 45.0°

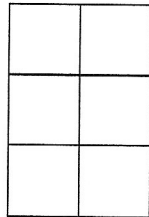
School Activities

Use the following information to answer question 25.

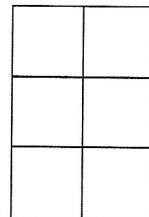
You stack some cube-shaped boxes of sports equipment in the school storage room. Three elevation views of your stack and its base plan are shown below.



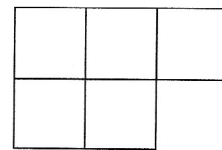
Front elevation
view



Left elevation
view



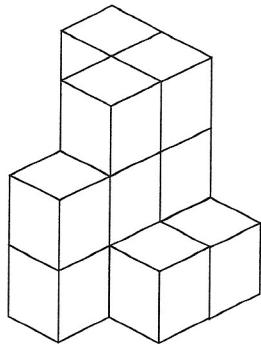
Right elevation
view



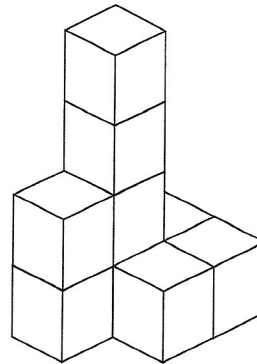
Base plan

25. Which of the following 3-D diagrams represents your stack of boxes?

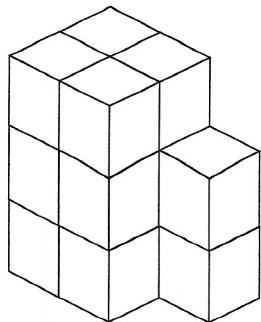
A.



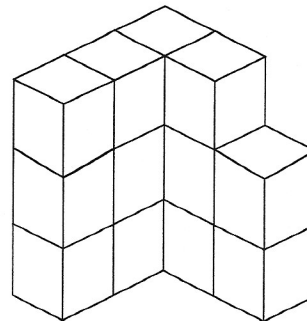
B.



C.



D.



26. In the school storage room, a tennis racket and a ski pole are both leaning against a wall at the same angle. The tennis racket's length is 60.0 cm, and it touches the floor 30.0 cm away from the wall. The ski pole touches the floor 67.5 cm away from the wall. What is the length of the ski pole?

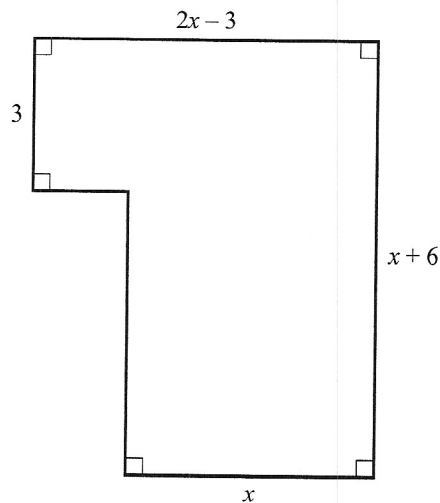
- A. 33.8 cm
 B. 37.5 cm
 C. 124 cm
 D. 135 cm

27. During badminton intramurals, 5 players compete in round robin play where each player plays every other player one game. No tie breaker games are required. The two players who win the most games meet in a final playoff game. Including the final game, how many games must be scheduled?

- A. 26 games
 B. 21 games
 C. 11 games
 D. 6 games

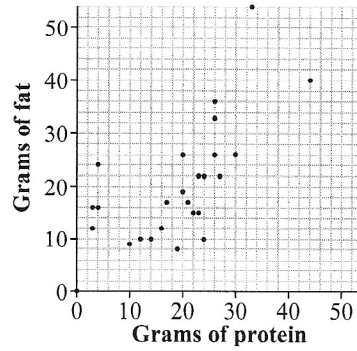
28. The school cafeteria is going to be carpeted. A diagram of the cafeteria is shown below. Which of the following expressions represents the area of the cafeteria?

- A. $x^2 - 9$
 B. $6x - 9$
 C. $x^2 + 9x - 9$
 D. $3x^2 + 9x - 27$



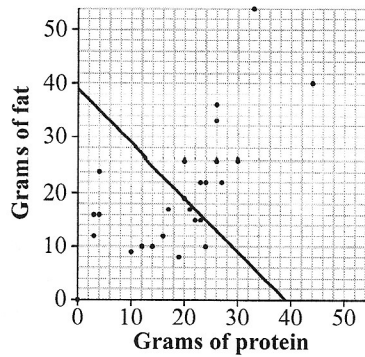
Use the following information to answer question 29.

The following scatter plot shows information from a study of the protein and fat contents of popular food items sold at the school cafeteria.

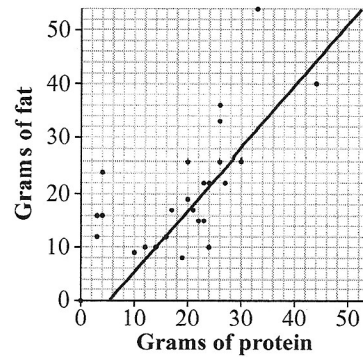


29. Which of the following graphs shows the **most reasonable** line of best fit for the information presented?

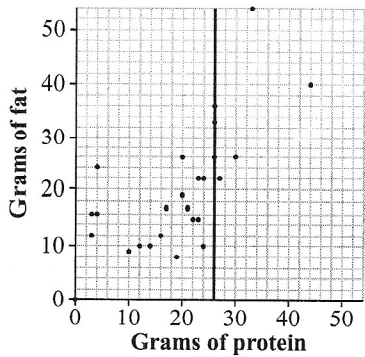
A.



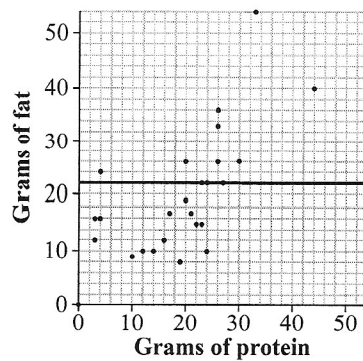
B.



C.



D.



30. In the school cafeteria, you purchase a can of juice that has a height of 16 cm and a diameter of 6 cm. The formula for the volume of a cylinder is $V = \pi r^2 h$. How much juice could the can hold?

- A. 301 mL
- B. 452 mL
- C. 576 mL
- D. 1 809 mL

31. In the cafeteria, Amber sold an average of \$32.50 worth of chocolates each day over a five-day period. In the first four days, her sales were \$39.00, \$12.75, \$16.75, and \$28.50. What were Amber's chocolate sales on the fifth day?

- A. \$8.25
- B. \$24.25
- C. \$64.50
- D. \$65.50

Use the following information to answer question 32.

The Yearbook Club decides to cut costs for the yearbook by reducing the picture size of personal photos. The original pictures have dimensions of $3.5 \text{ cm} \times 4.0 \text{ cm}$.



Coach Johnson

32. If **each dimension is reduced by 15%**, then the final reduced copy will have an area of

- A. 14.0 cm^2
- B. 11.1 cm^2
- C. 10.1 cm^2
- D. 16.1 cm^2

Summer Vacation

Summer vacation has finally arrived! Grade 9 final exams have been completed, and a great summer awaits you. You belong to a travel club, and you are on the way to the airport to fly to London, England, for a one-week holiday.

The questions in this section fall under the sub-headings

- at the airport before departure
- takeoff, flight, and landing
- on tour in London

At the Airport Before Departure

33. At the airport, your friend Michael goes to a gift shop with \$45.00. He spends $\frac{2}{3}$ of his money on a new shirt. He spends $\frac{1}{5}$ of the remaining money on a Logic Puzzle Magazine. How much money does Michael have left?

- A. \$6.00
- B. \$12.00
- C. \$24.00
- D. \$30.00

34. To enter the boarding area, each person walks through a metal detector. If 1 person out of every 10 people sets off the detector, what is the probability that 2 people selected at random will both set off the detector?

- A. $\frac{1}{10}$
- B. $\frac{2}{10}$
- C. $\frac{1}{100}$
- D. $\frac{81}{100}$

Use the following information to answer question 35.

In the boarding area, a vending machine attendant is servicing the machines. In one of the machines, the attendant finds that the dollar coins, quarters, and dimes have a total value of \$67.40. There are 50 more dollar coins than quarters and twice as many dimes as quarters.

35. What is the total value of the dimes the attendant collected?

- A. \$1.20
- B. \$2.40
- C. \$12.00
- D. \$24.00

36. While looking out the windows in the boarding area, you notice a cargo plane being loaded. The total volume of storage space available on the cargo plane is $1.488 \times 10^3 \text{ m}^3$. How many crates with a volume of $1.24 \times 10^1 \text{ m}^3$ can fit in this storage space?

- A. 1.20×10^4 crates
- B. 1.20×10^3 crates
- C. 1.20×10^2 crates
- D. 1.20×10^1 crates

Takeoff, Flight, and Landing

Use the following information to answer question 37.

Your plane requires 20 L of fuel for each kilometre travelled after it reaches cruising altitude.

To determine the total amount of fuel required for a flight (F), the pilot also needs to know:

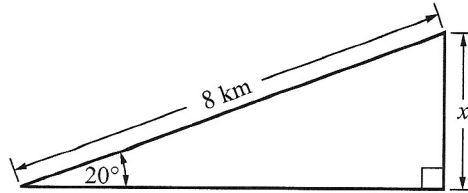
- the amount of fuel needed to reach cruising altitude (A)
- the distance, in kilometres, travelled after the plane reaches cruising altitude (C)
- the amount of fuel needed for descent and landing (D)

37. Which of the following formulas represents the total amount of fuel required for the flight?

- A. $F = C + A + 20F$
- B. $F = C + D + 20A$
- C. $F = A + C + 20D$
- D. $F = A + D + 20C$

Use the following information to answer question 38.

After takeoff, your plane ascends along its flight path at an angle of 20° .



38. A formula that can be used to find the plane's vertical height (x), in kilometres, above ground level after it has travelled 8 km along its flight path is

- A. $\sin 20^\circ = \frac{x}{8}$
- B. $\sin 20^\circ = \frac{8}{x}$
- C. $\cos 20^\circ = \frac{x}{8}$
- D. $\cos 20^\circ = \frac{8}{x}$

During the flight to London, you try to solve two puzzles from your Logic Puzzle Magazine.

Use the following puzzle to answer question 39.

Integer Insanity!

Legend

- X Road block
- Dead end
- H Hotel
- M Museum

N
↑

To solve this puzzle, let

- positive integers represent movements north or east
- negative integers represent movements south or west
- 1 block = 1 integer value

39. In the first puzzle, which of the following sets of integers represents the shortest route, in blocks, from the hotel to the museum?

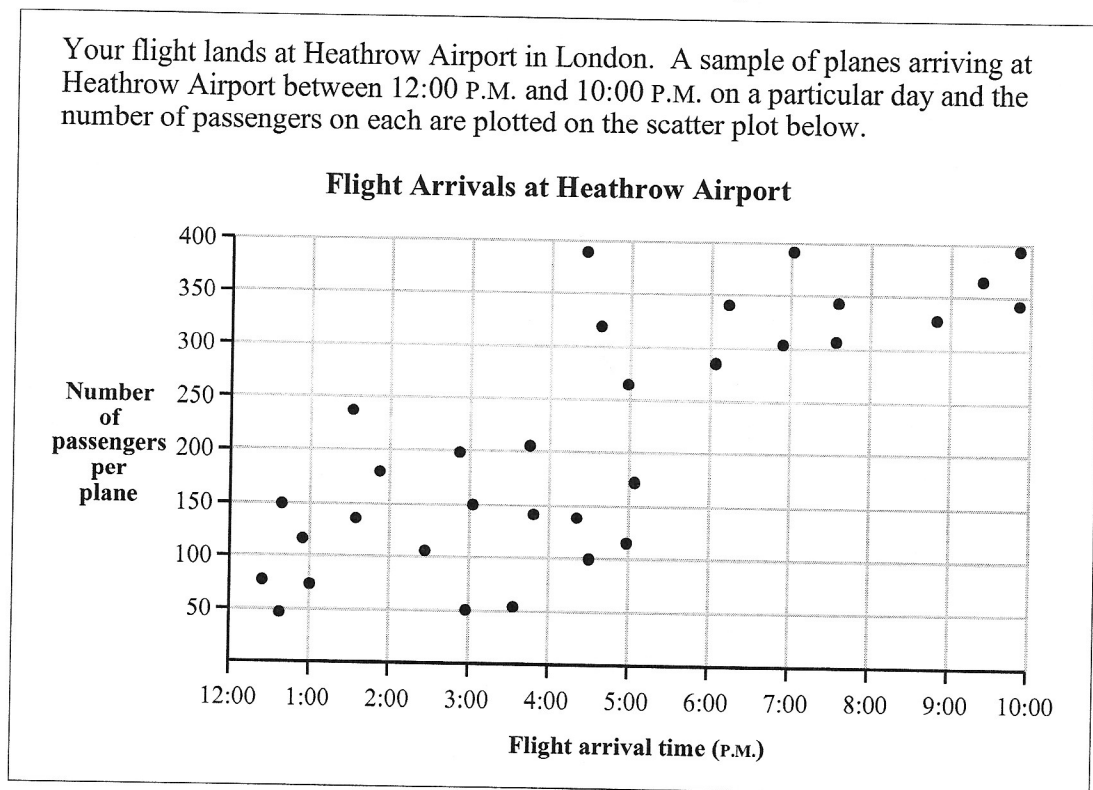
- A. +2, +1, +2, -5
- B. -5, +3, +1, +1
- C. +1, +1, +3, -5
- D. -2, +3, -2, +1

40. In the second puzzle, two buses leave from a particular gas station at the same time. One bus travels east at 90 km/h. The other bus travels west at 100 km/h. How long will it take before the buses are 570 km apart?

- A. 6 h
 B. 5.7 h
 C. 3 h
 D. 1.5 h

Use the following information to answer question 41.

Your flight lands at Heathrow Airport in London. A sample of planes arriving at Heathrow Airport between 12:00 P.M. and 10:00 P.M. on a particular day and the number of passengers on each are plotted on the scatter plot below.



41. The scatter plot shows that
- A. in the afternoon fewer planes land than in the evening
 B. in the evening there are more passengers per plane than in the afternoon
 C. in the evening more planes land than in the afternoon
 D. in the afternoon there are more passengers per plane than in the evening

On Tour in London

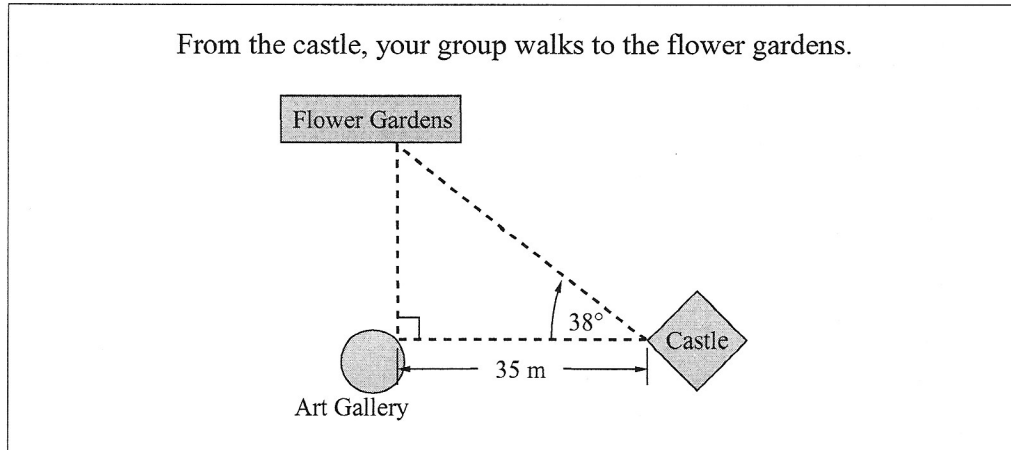
42. While on a tour, you see a rectangular dock on the River Thames. The area of the surface of the dock can be represented by $24y^2$ square units. The length is 6 times the width. What are the dimensions of the surface of the dock?

- A. $2y$ units by $12y$ units
- B. $4y$ units by $24y$ units
- C. y units by $6y$ units
- D. y units by $24y$ units

43. Your tour stops at a castle. You stop for a rest $\frac{1}{3}$ of the way up a stairway in the castle. If you climb 11 more steps, you will be $\frac{1}{2}$ of the way up. How many steps are there in the stairway?

- A. 33 steps
- B. 44 steps
- C. 66 steps
- D. 132 steps

Use the following information to answer question 44.



44. What is the shortest distance from the castle to the flower gardens?

- A. 57 m
- B. 49 m
- C. 44 m
- D. 28 m

*You have now completed the multiple-choice questions.
Proceed directly to the numerical-response questions.*

Numerical-Response Questions

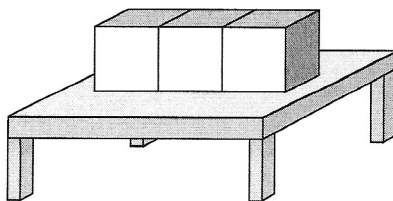
Use the following information to answer question 1.

The members of a student council held a school dance. The DJ they hired charges a basic fee of \$300 and an additional charge of \$1.50 per student that attends the dance.

1. If the DJ charged the student council \$487.50, how many students attended the dance?

Use the following information to answer question 2.

When cubes are placed side by side, the number of faces (f) of the cubes that can be seen as you walk around them is related to the total number of cubes (c), as shown in the table below.



c	1	2	3	4
f	5	8	11	14

2. If 11 cubes are placed side by side, how many faces can be seen?

Use the following information to answer question 3.

A diver steps off a diving board. The time in seconds (t) that it takes her to hit the water is related to the distance in metres (d) from the diving board to the surface of the water. The formula that can be used to calculate the distance from the diving board to the surface of the water is

$$d = 4.9t^2$$

3. If it takes the diver 0.6 seconds to hit the water, the distance from the diving board to the surface of the water is _____ m. (Round your answer to the nearest hundredth of a metre.)

4. What is the value of $2^3 + 4^{-1}$ expressed as a decimal?

Use the following information to answer question 5.

The intramural results of four teams are shown below.

Team	Participation Points	Wins	Losses	Defaults (No Shows)	Total Points
9A	90	11	4	0	
9B	70	8	5	2	
9C	70	4	9	2	
9D	80	7	7	1	

Total points are calculated by adding participation points to the total of the points for Wins, Losses, and Defaults. The coach gives each win 5 points, each loss 0 points, and each default -5 points.

5. By how many points does Team 9A lead Team 9C?

6. A foghorn sounds a blast for 2 seconds and then is silent for 8 seconds. This pattern continues for $3\frac{1}{2}$ hours. How many blasts does the foghorn make in this period of time?

*You have now completed the test.
If you have time, you may wish to check your answers.*