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DIRECTIONS FOR MATHEMATICS

The Mathematics section of the Grade Eight Proficiency Assessment is made up of three parts consisting of multiple-choice questions and open-ended questions.

Work as rapidly as you can without sacrificing accuracy. Do not spend too much time puzzling over a question that seems too difficult for you. Answer the easier questions first; then return to the harder ones. Try to answer every question, even if you have to guess.

Where necessary, you may use scratch paper and blank spaces in the test booklet for your work. Do not use the margins or back of the answer folder to do scratchwork.

YOU MUST RECORD ALL OF YOUR ANSWERS IN THE SEPARATE ANSWER FOLDER. No credit will be given for anything written in this test booklet. Your responses must be in English in order to be scored.

For multiple-choice questions, mark only one answer for each question by filling in the corresponding circle on the answer folder. MAKE SURE THAT EACH MARK IS HEAVY AND DARK AND COMPLETELY FILLS THE CIRCLE. If you change an answer, be sure to erase your first choice completely. Incomplete erasures may be read as intended answers.

Respond FULLY to the open-ended questions in the area provided in the answer folder. Specific directions with each question will refer you to the page in your answer folder where your response is to be written. For each of these questions, provide enough explanation so that the scorer can understand your solution. You will be graded on the correctness of your methods as well as the accuracy of your answer.

In addition to a ruler and geometric shapes, the Mathematics Reference Sheet provides formulas and other information you may find useful. You may use the information on the reference sheet and a calculator to help solve problems on the test.

You will have 1 hour and 45 minutes to complete the three parts of the Mathematics test. You will be given short breaks after each 35-minute part.

MATHEMATICS - PART 1

DIRECTIONS FOR QUESTIONS 1 THROUGH 12: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case, and fill in the corresponding lettered space on page 18 in your answer folder with a heavy, dark mark so that you cannot see the letter. Unless you are told to do so in the question, do NOT include sales tax in your answer to questions involving purchases.

1. The nutrition label on a box of cookies states that there are 14 servings in the box and that one serving contains 6.5 grams of fat. Joe ate about one-half of the cookies in the box. Which is the best estimate of the number of grams of fat he ate?

   A. 7 g
   B. 45 g
   C. 80 g
   D. 100 g

2. The police are looking for a helicopter that took off from an airfield in central New Jersey. They know it only had enough fuel to travel 50 miles. What is the shape of the region they should search?

   A. a square
   B. a rectangle
   C. a triangle
   D. a circle

3. The Atco Company randomly selected 1,000 bills being sent out by its billing department and found errors on 3 bills. Based on this information, how many of the 24,000 bills sent out each month can be expected to be incorrect?

   A. 8
   B. 72
   C. 720
   D. 8,000

4. Which of the following equations gives the rule for finding the numbers in the column on the right?

x	*y*
1	7
2	11
3	15

   A. $y = x + 4$
   B. $y = 2x + 5$
   C. $y = x + 6$
   D. $y = 4x + 3$

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5. Pentomino K on your Mathematics Reference Sheet is the same size and shape as the figures below. You may wish to use Pentomino K as an aid in answering the following question.

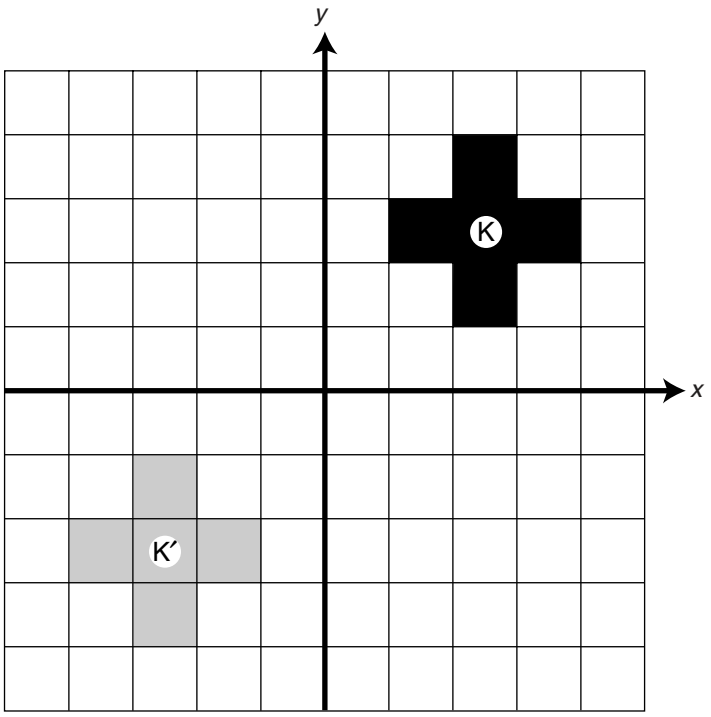


Figure K′ is the result of a sequence of transformations of Figure K. Which of the following does NOT describe a correct possible sequence of transformations?

A. a translation of Figure K down 5 units, then a translation to the left 5 units

B. a reflection of Figure K across the *x*-axis, then a translation to the left 5 units

C. a reflection of Figure K across the *y*-axis, then a translation down 4 units

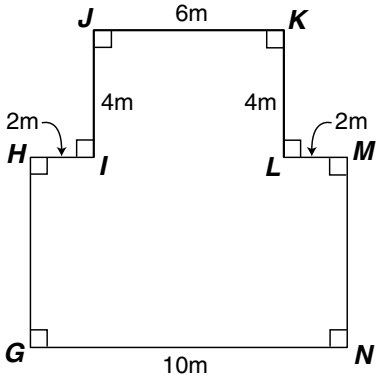
D. a reflection of Figure K across the *x*-axis, then a reflection across the *y*-axis

6. The salaries of the employees at Dean's Print Shop are $24,000, $37,000, $12,000, $17,000, $26,000, $40,000, and $19,000.

What is the median salary of the employees?

A. $25,000
B. $24,000
C. $17,000
D. $12,000

7. The perimeter of this figure is 40 meters.



What is the measure of $\overline{HG}$?

A. 6 m
B. 8 m
C. 10 m
D. 12 m

8. A computer manufacturer planning to produce many computers can choose to use Intel computer chips at $900 each or Motorola computer chips at $374 each. How much money would that manufacturer save on an order of 20,000 central-processor chips by choosing the Motorola chip rather than the Intel chip?

A. $18,000,000
B. $10,520,000
C. $ 7,480,000
D. $ 336,600

9. For a convex polygon with a small number of sides, like a rectangle or a hexagon, it's easy to draw the figure and count its diagonals. Suppose the convex polygon has many sides. It is possible to find how many diagonals it has without drawing the figure and counting its diagonals. The following formula gives that information:

$$\text{Number of Diagonals} = \frac{n^2 - 3n}{2}$$

where n = number of sides

Using the formula above, find the number of diagonals for a convex polygon with 107 sides. Which of the following is the number of diagonals for that polygon?

A. 11,128
B. 5,564
C. 106
D. 54

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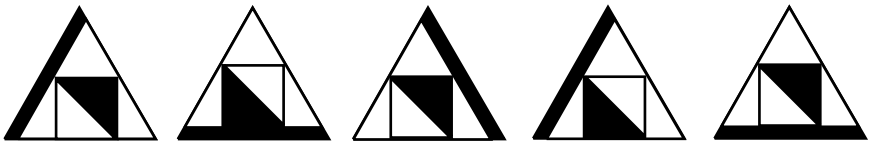
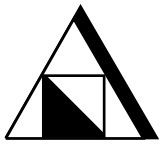
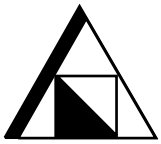
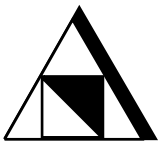
10. These figures form a pattern.

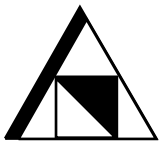


Which of the figures below BEST continues the pattern?

A. 

B. 

C. 

D. 

11. Allison was born on her mother's 28th birthday. Which expression can be used to find Allison's mother's age when Allison is n years old?

A. $28 + n$
B. $28 - n$
C. $28 \times n$
D. $28 \div n$

12. Steve's parents told him he could order $250 worth of school clothes from a certain catalog. So far, his order includes 3 pairs of slacks at $21.99 each and a jacket for $125.99. What is the greatest number of shirts that he can order if they cost $14.99 each?

A. 2
B. 3
C. 4
D. 6

GO ON TO THE NEXT PAGE.

DIRECTIONS FOR QUESTION 13: Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You will be graded on the correctness of your method as well as the accuracy of your answer. Write your answer on page 19 in your answer folder.

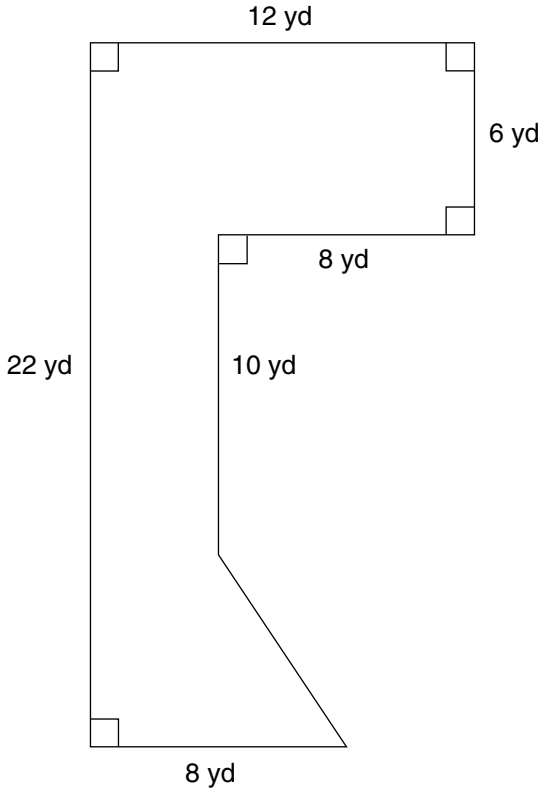
13. On the number line in your answer folder, plot points for the following numbers.

$\frac{4}{5}$, 0.6

- Label each point.
- Name two different rational numbers that are greater than 0.6 and less than $\frac{4}{5}$. (Write one of your numbers in fractional form and write the other number in decimal form.)
- Explain how you know that each of your numbers is greater than 0.6 and less than $\frac{4}{5}$.

DIRECTIONS FOR QUESTION 14: Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You will be graded on the correctness of your method as well as the accuracy of your answer. Write your answer on page 20 in your answer folder.

14. The floor of an entranceway and corridor in an office building is to be covered with vinyl flooring. Find the number of square yards of flooring that will be needed. Use the diagram provided in your answer folder to show how you found the area of the floor. Show all your work.



END OF PART 1
You may check your work on this part only. DO NOT GO ON TO THE NEXT PAGE.

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MATHEMATICS - PART 2

DIRECTIONS FOR QUESTIONS 15 THROUGH 25: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case, and fill in the corresponding lettered space on page 21 in your answer folder with a heavy, dark mark so that you cannot see the letter. Unless you are told to do so in the question, do NOT include sales tax in your answer to questions involving purchases.

15. Point *P* has the coordinates (–1, 2). What are the coordinates of its image point if it is translated 4 units to the left and then reflected in the *x*-axis?

    A. (3, 2)
    B. (3, –2)
    C. (–5, 2)
    D. (–5, –2)

16. City bus #14 arrives at Grand Street every 10 minutes, starting at 6:00 a.m. The dispatcher is setting the schedule for an additional bus that will arrive at Grand Street every 20 minutes. The dispatcher does not want the two busses to arrive at Grand Street at the same time. Which of these starting times will be best for the additional bus?

    A. 6:00 a.m.
    B. 6:05 a.m.
    C. 6:10 a.m.
    D. 6:30 a.m.

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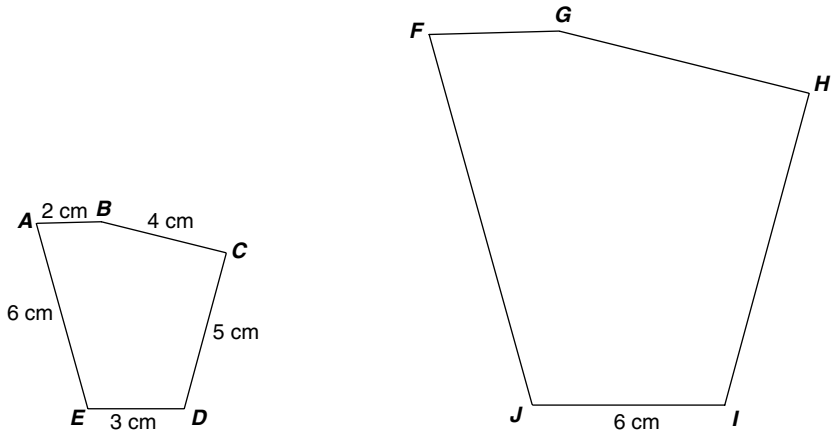
17. Figure *ABCDE* is similar to figure *FGHIJ*.



What is the measure of $\overline{GH}$?

A. 4 cm
B. 6 cm
C. 8 cm
D. 10 cm

18. A number cube has sides numbered 1 to 6. If the cube is rolled once, what is the probability that the number rolled is a factor of 6?

A. $\frac{1}{6}$
B. $\frac{1}{3}$
C. $\frac{2}{3}$
D. $\frac{5}{6}$

19. A regular human hand contains 27 different bones. There are 206 bones altogether in the whole human body. Approximately what percent of the bones in a whole human body are in one hand?

A. about 1.3%
B. about 7.6%
C. about 13%
D. about 26%

GO ON TO THE NEXT PAGE.

20. Janet works 38 hours per week and earns $11.82 per hour. Which is the best estimate of her gross pay per year?

A. $440
B. $2,400
C. $24,000
D. $44,000

21. Which list shows elevations above and below sea level in order from the lowest elevation to the highest?

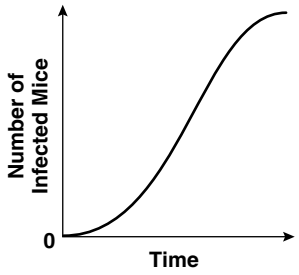
A. – 400 ft, – 20 ft, 350 ft, 1,200 ft
B. – 20 ft, – 400 ft, 350 ft, 1,200 ft
C. – 20 ft, 350 ft, – 400 ft, 1,200 ft
D. 1,200 ft, 350 ft, – 400 ft, – 20 ft

22. The chance of rain Saturday is 30%. The chance of rain Sunday is 60%. What is the probability that it will rain both days?

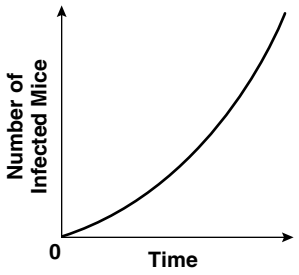
A. 18%
B. 30%
C. 60%
D. 90%

23. A bacterial infection in a colony of mice began slowly and then increased exponentially. After a few weeks, the rate of infection slowed down. Which graph best shows the relationship between time and the number of infected mice?

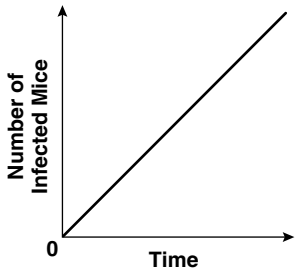
A.



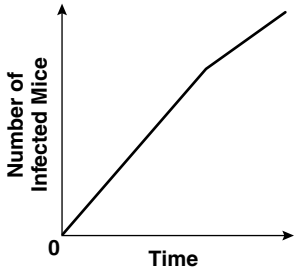
B.



C.



D.



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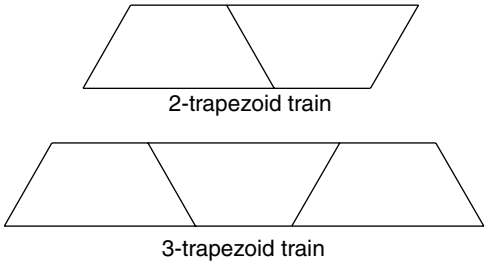
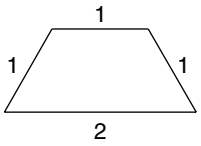
24. Marcia is making trapezoid trains with her trapezoid blocks.



Three sides of a trapezoid block measure 1 unit each. The fourth side measures 2 units.

A trapezoid block



What is the perimeter of a trapezoid train made up of 10 trapezoid blocks?

A. 22 units
B. 30 units
C. 32 units
D. 50 units

25. The winning distances for the Olympic shot put event for the past 100 years are given below:

1896 - 36 ft $9\frac{1}{4}$ in.	1956 - 60 ft 11 in.
1900 - 46 ft $3\frac{1}{8}$ in.	1960 - 64 ft $6\frac{3}{4}$ in.
1904 - 48 ft 7 in.	1964 - 68 ft $8\frac{1}{2}$ in.
1908 - 46 ft $7\frac{1}{2}$ in.	1968 - 67 ft $4\frac{3}{4}$ in.
1912 - 50 ft 4 in.	1972 - 69 ft 6 in.
1920 - 48 ft $7\frac{1}{8}$ in.	1976 - 69 ft $6\frac{7}{10}$ in.
1924 - 49 ft $2\frac{1}{2}$ in.	1980 - 70 ft $\frac{1}{2}$ in.
1928 - 52 ft $1\frac{3}{16}$ in.	1984 - 69 ft 9 in.
1932 - 52 ft $6\frac{3}{16}$ in.	1988 - 73 ft $8\frac{3}{4}$ in.
1936 - 53 ft $1\frac{3}{4}$ in.	1992 - 71 ft $2\frac{1}{2}$ in.
1948 - 56 ft 2 in.	1996 - 70 ft 11 in.
1952 - 57 ft $1\frac{1}{2}$ in.	

Which statement best summarizes the data?

A. The winning distances increased by more than 70 feet over 100 years.
B. The winning distance in one Olympics was always greater than the winning distance of the previous Olympics.
C. The records show one result for every four years, starting in 1896.
D. The winning distances varied but generally increased over time.

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DIRECTIONS FOR QUESTION 26: Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You will be graded on the correctness of your method as well as the accuracy of your answer. Write your answer on page 22 in your answer folder.

26. At 9:00 a.m. on the super-sale day at Clothing City, Amy saw the coat she wants priced at $65. Amy has only $46. Every hour the price on coats will be reduced 10% from the previous hour's price.

    - At what time will Amy be able to buy the coat for $46 or less, provided the coat is still available?

    - Explain in detail how you found your answer.

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DIRECTIONS FOR QUESTION 27: Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You will be graded on the correctness of your method as well as the accuracy of your answer. Write your answer on page 23 in your answer folder.

27. This computer spreadsheet gives information about the pens Ms. Nunez sells in her store.

A	B	C	D	E	F
Type of pen	**No. bought**	**Unit cost**	**Selling price**	**No. sold**	**Amt. received**
Economy	500	$ 0.12	$ 0.36	270	$ 97.20
Better	350	$ 0.28	$ 0.84	191	$ 160.44
Best	175	$ 2.25	$ 6.75	15	$ 101.25

When Ms. Nunez changes the numbers in columns C and E, the numbers in columns D and F change automatically.

- Using words or formulas, explain how the *Selling price* (column D) is calculated using the *Unit cost* (column C).

- Using words or formulas, explain how the *Amt. received* (column F) is calculated from the numbers in the other columns.

- Select one type of pen from column A in the spreadsheet above. Write new numbers for that row to show what would happen to the *Selling price* (column D) and the *Amt. received* (column F) if the *Unit cost* (column C) is twice as much as the one shown.

- Explain in words what happened to the *Selling price* (column D) and the *Amt. received* (column F) when the unit cost was doubled.

END OF PART 2
You may check your work on this part only.
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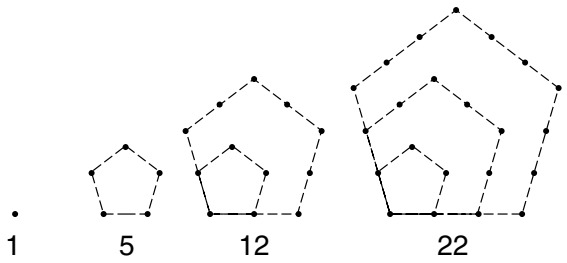
MATHEMATICS - PART 3

DIRECTIONS FOR QUESTIONS 28 THROUGH 38: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case, and fill in the corresponding lettered space on page 24 in your answer folder with a heavy, dark mark so that you cannot see the letter. Unless you are told to do so in the question, do NOT include sales tax in your answer to questions involving purchases.

28. Which of these numbers is the greatest prime number less than 70?

A. 69
B. 67
C. 59
D. 57

29. The first four pentagonal numbers are indicated below. The numbers are calculated by counting the dots. Based upon the pattern indicated, what is the **sixth** pentagonal number?



A. 35
B. 51
C. 70
D. 92

30. In 1991, an American, Ann Trason, set a world record by running 100 km in

Hours	Minutes	Seconds
7	50	09

Which is the best estimate of her average speed?

A. 12 km per hr
B. 14 km per hr
C. 16 km per hr
D. 18 km per hr

31. Erin calculated the mean of 5 numbers to be 38. Then she found that she had made an error and had written 40 for one of the numbers when she should have written 30. What is the mean of the correct 5 numbers?

A. 28
B. 30
C. 36
D. 40

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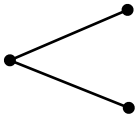
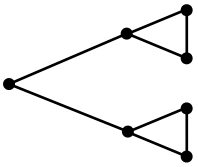
32. A computer network is to be set up so that

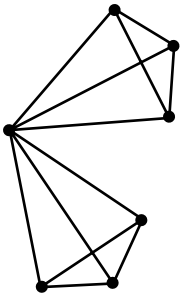
- the supervisor can communicate with every terminal, and
- each worker can communicate with the supervisor and exactly two co-workers.

Which network meets these requirements?

A.

B. 

C. 

D. 

33. These two boxes have the same volume.

Box *A*
Height: 2 in., Width: 3 in., Length: 6 in.

Box *B*
Height: 3 in., Width: 4 in., Length: ?

What is the length of Box *B*?

A. 2 in.
B. 3 in.
C. 4 in.
D. 9 in.

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34. A wooden box with 8 video cassettes inside weighs 4.2 kilograms. The box weighs 0.6 kg when it is empty. Using w to represent the weight of one video cassette, which of the following describes this situation?

A. $8w = 4.2$
B. $8w + 0.6 = 4.2$
C. $8w - 0.6 = 4.2$
D. $8(w + 0.6) = 4.2$

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35. The diameter of a circular opening is $2\frac{1}{4}$ inches.

Which of the following is the diameter of the largest pipe that will fit in that opening?

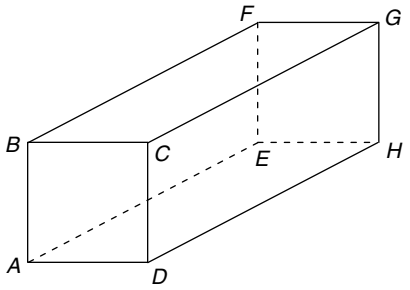
A. $2\frac{3}{16}$ inches

B. $2\frac{1}{8}$ inches

C. $2\frac{1}{16}$ inches

D. $2\frac{1}{32}$ inches

36. The figure below is a rectangular prism. Which of the following edges is perpendicular to face *BFGC*?



A. $\overline{AB}$

B. $\overline{AE}$

C. $\overline{DH}$

D. $\overline{BF}$

37. It takes 20 minutes per pound to cook a turkey. Mona's turkey weighs $7\frac{1}{2}$ pounds. Peter's turkey weighs 9 pounds. How much longer will it take to cook Peter's turkey?

A. 20 minutes

B. 30 minutes

C. 40 minutes

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

38. For the school festival, Polly wants to make a snack mixture with 2 parts of dried fruit to every 3 parts of assorted nuts. How much dried fruit will she need to make 30 pounds of the mixture?

A. 9 pounds

B. 12 pounds

C. 15 pounds

D. 20 pounds

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DIRECTIONS FOR QUESTION 39: Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You will be graded on the correctness of your method as well as the accuracy of your answer. Write your answer on page 25 in your answer folder.

39. This table shows the number of employees at StarDex Corporation by department.

Department	Number of Employees
Purchasing	2
Billing	6
Credit	3
Sales	12
Inventory	3
Manufacturing	22
Bookkeeping	2

Every employee at StarDex put his or her name on an index card. At the company picnic one card will be drawn at random. The person whose name is drawn will win the grand prize.

Bob, who works in Credit, is discussing the contest with Sandra, who works in Sales.

Bob says, "I have a better chance of winning than you because there are fewer people in my department."

Sandra says, "No, Bob, we both have the same chance of winning."

- Is Bob correct that he is more likely to win than Sandra? Explain your answer.

Then Sandra says, "However, I think it is 4 times more likely that someone from Credit will win than someone from Sales."

- Is Sandra correct that it is 4 times more likely that someone from Credit will win than someone from Sales? Explain your answer.

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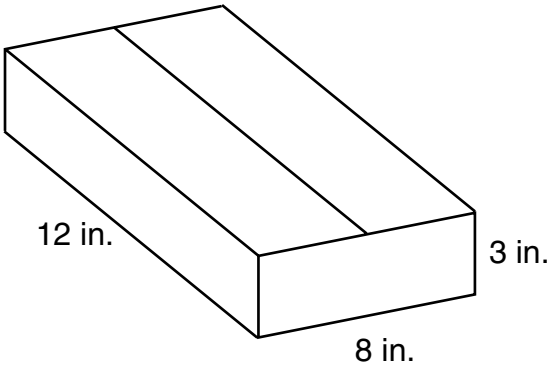
DIRECTIONS FOR QUESTION 40: Respond fully to the open-ended question that follows. Show your work and clearly explain your answer. You will be graded on the correctness of your method as well as the accuracy of your answer. Write your answer on page 26 in your answer folder.

40. The Packing Company wants to lower the cost of its boxes by reducing the surface area while keeping the volume the same. One of the boxes is shown below.



- Find the volume of this box. Show how you found your answer.

- Find the surface area of this box. Show how you found your answer.

- Find the dimensions of a box that has the same volume but less surface area. Show how you found your answer.

END OF PART 3
You may check your work on this part only.

STOP