Name: _____     Date: _____

# *MathLinks 8* Option 1
# Final Exam Multiple Choice and
# Numerical Response

*Record your answers on the answer sheet provided.*

**Space and Technology**

Humans continue to explore creative ways to travel in space. When a spacecraft is being designed, mathematics is needed to make precise calculations and predictions. Use your mathematical skills to solve problems related to space and technology.
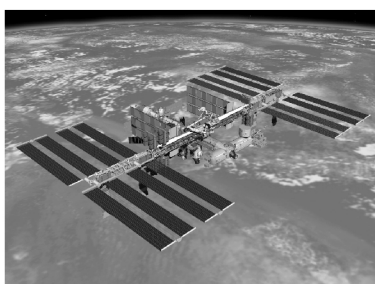


*Use this information to answer #1–3.*

The space shuttle has a covering of protective tiles to keep from burning up when re-entering Earth's atmosphere. On an average, 50 of 24 000 tiles are lost on re-entry.

**1.** What percent of tiles, to the nearest hundredth, is lost on re-entry?
   **A** 0.01%        **B** 0.02%        **C** 0.21%        **D** 0.23%

**2.** What is the ratio of lost tiles to total tiles, in lowest terms?
   **A** 50:24000     **B** 5:2400       **C** 2:960        **D** 1:480

**3.** If the space shuttle had 50 400 tiles, predict how many tiles would be lost on re-entry.
   **A** 103          **B** 104          **C** 105          **D** 106

Name: _____ Date: _____
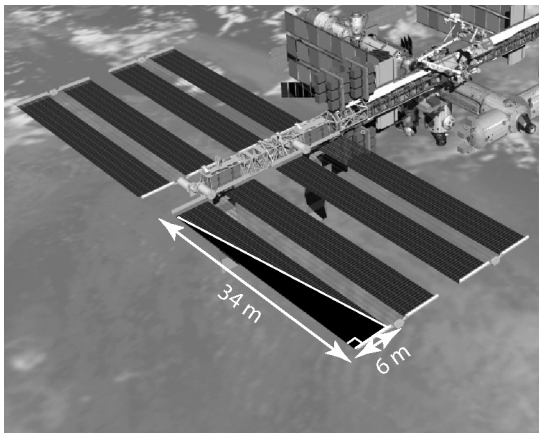
*Use this information to answer #4.*

The payload bay area of the space shuttle is a cylindrical storage area for carrying equipment. The length of the payload bay is 18.0 m and its diameter is 4.6 m.

Payload Bay

18.0 m

NASA
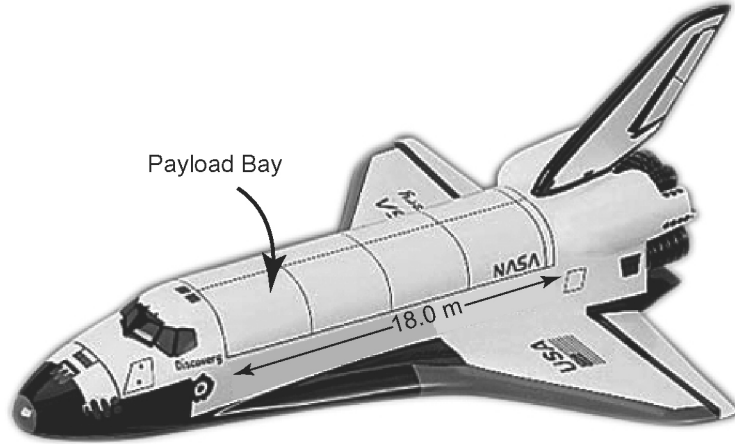
**4.** What is the volume of the payload bay area, to the nearest metre?

 **A** 305 m$^2$ **B** 300 m$^2$ **C** 299 m$^2$ **D** 296 m$^2$

*Use this information to answer #5.*

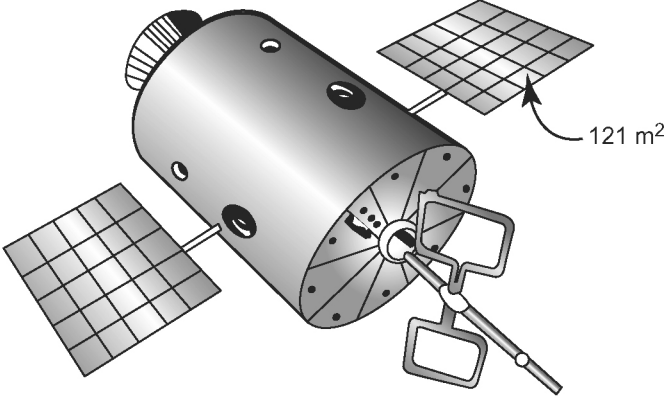The International Space Station (ISS) collects its energy from solar panels.

34 m

6 m

**Numerical Response**

**5.** If each solar panel is 34 m long and 6 m wide, how long is the diagonal, to the nearest tenth of a metre?

*Use this information to answer #6.*

Satellites that orbit Earth also have solar panels. The large panels are square with an area of 121 m². Each large square panel is made of several smaller squares.

121 m²

## Numerical Response

**6.** What is the length of a side of a large square panel?

*Use this information to answer #7.*

NASA will replace the space shuttle with the Orion in 2014. During a test flight of Orion, the following groups of people were watching in the spectator area.

| Group | Total |
|---|---|
| Parents | 33 |
| Teachers | 8 |
| Students | 120 |
| Others | 41 |

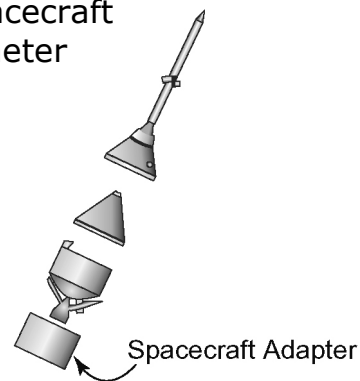**7.** Which is the best choice of graph to display the above data?
   **A** double bar graph    **B** double line graph    **C** pictograph    **D** bar graph

*Use this information to answer #8.*

The Orion has four sections. The bottom section, the spacecraft adapter, is in the shape of a right cylinder. It has a diameter of 5.5 m and a height of 3.3 m.
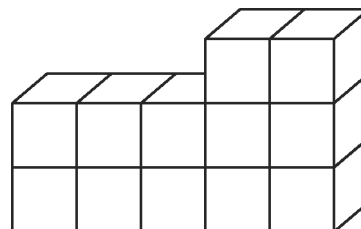
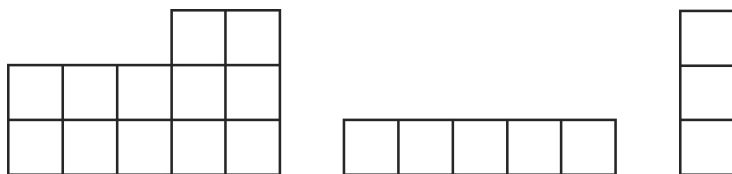Spacecraft Adapter

## Numerical Response

**8.** What is the surface area of the curved face and one base, to the nearest tenth of a square metre?

*Use this information to answer #9.*

Supplies for space missions are transported to the launch site in storage boxes. The boxes are stacked as shown.

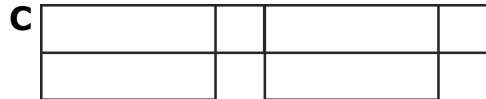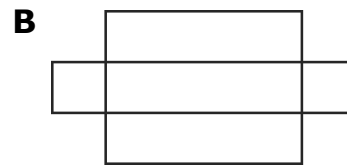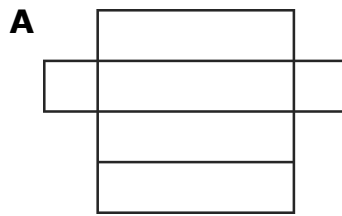**9.** These diagrams show three views of the stack of storage boxes.

What are the views from left to right?
**A** front, side, top   **B** top, front, side   **C** side, top, front   **D** front, top, side

**10.** A storage box is in the shape of a long rectangular prism. It has no top. Which diagram could be the net for the storage box?

**A**

**B**

**C**

**D**

**11.** The equation, $y = 3(x - 100)$, was used by one of the flight technicians. Which table of values represents the equation?

**A**

| x | y |
|---|---|
| 10 | 330 |
| 20 | 360 |
| 30 | 390 |
| 40 | 420 |

**B**

| x | y |
|---|---|
| 110 | 10 |
| 120 | 20 |
| 130 | 30 |
| 140 | 40 |

**C**

| x | y |
|---|---|
| 100 | 0 |
| 101 | 3 |
| 102 | 6 |
| 103 | 9 |

**D**

| x | y |
|---|---|
| 105 | −15 |
| 106 | −18 |
| 107 | −21 |
| 108 | −24 |

**12.** One of the calculations used was in the form of the following expression.
$1 + 4 \times (-2) + (-6) \div (-2) + 10$
What is the answer to the calculation?

**A** 13          **B** 12          **C** 6          **D** 2

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**The Great Outdoors**

The outdoors is home to many recreational activities as well as many jobs. Apply your understanding of mathematics to solve problems related to the outdoors.

Name: _____ Date: _____

*Use this information to answer #13–14.*

A campground owner kept records of the first 144 000 requests for campsites by type that were received for each of two years.
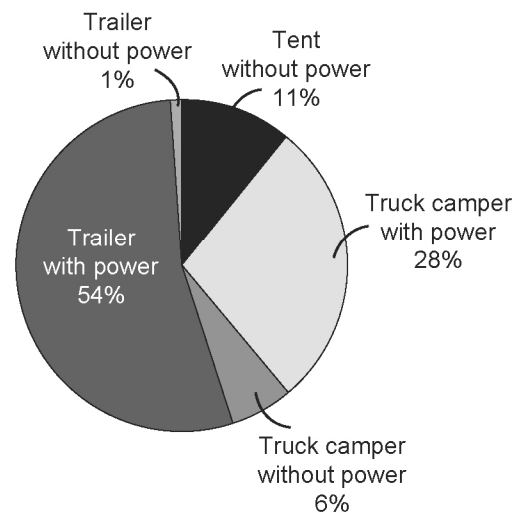
| Type of Campsite Requested | Year 1 | Year 2 |
| --- | --- | --- |
| Tent without power | 18 000 | 16 296 |
| Truck camper with power | 37 800 | 40 100 |
| Truck camper without power | 9 600 | 8 735 |
| Trailer with power | 76 480 | 77 480 |
| Trailer without power | 1 320 | 1 389 |
| Total | 144 000 | 144 000 |

Then, the owner created two circle graphs to compare the data.



Type of Campsite Requested in Year 1
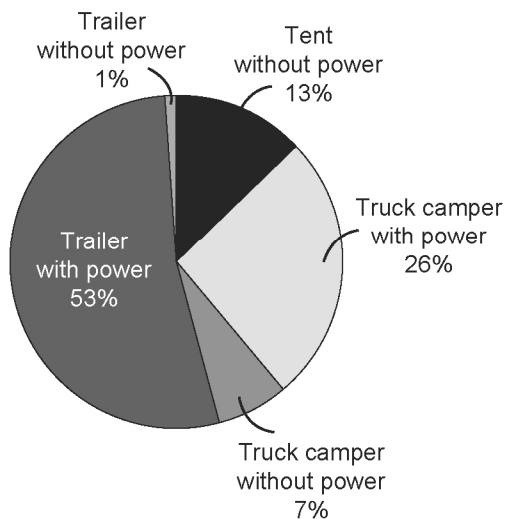


Type of Campsite Requested in Year 2

**13.** One conclusion that can be drawn from the data collected is

**A** requests for Truck camper with power campsites doubled from Year 1 to Year 2

**B** more campsites were requested With power than Without power in both years

**C** requests for Trailer without power campsites showed the greatest increase from Year 1 to Year 2

**D** requests for Tent without power campsites decreased from Year 1 to Year 2 because more campers wanted power

**14.** What is the increase in the number of requests for Trailer with power campsites from Year 1 to Year 2, expressed as a percent of the total number of requests?

**A** 6.90%          **B** 0.69%          **C** 0.069%          **D** 0.0069%

*Use this information to answer #15.*

The campground owner wants to expand the campground believing more campsites with power are needed. A neighbourhood group prefers no expansion. Both the owner and the neighbourhood group circulated flyers with a graph to area residents.

**Graph for Flyer 1**



**Graph for Flyer 2**
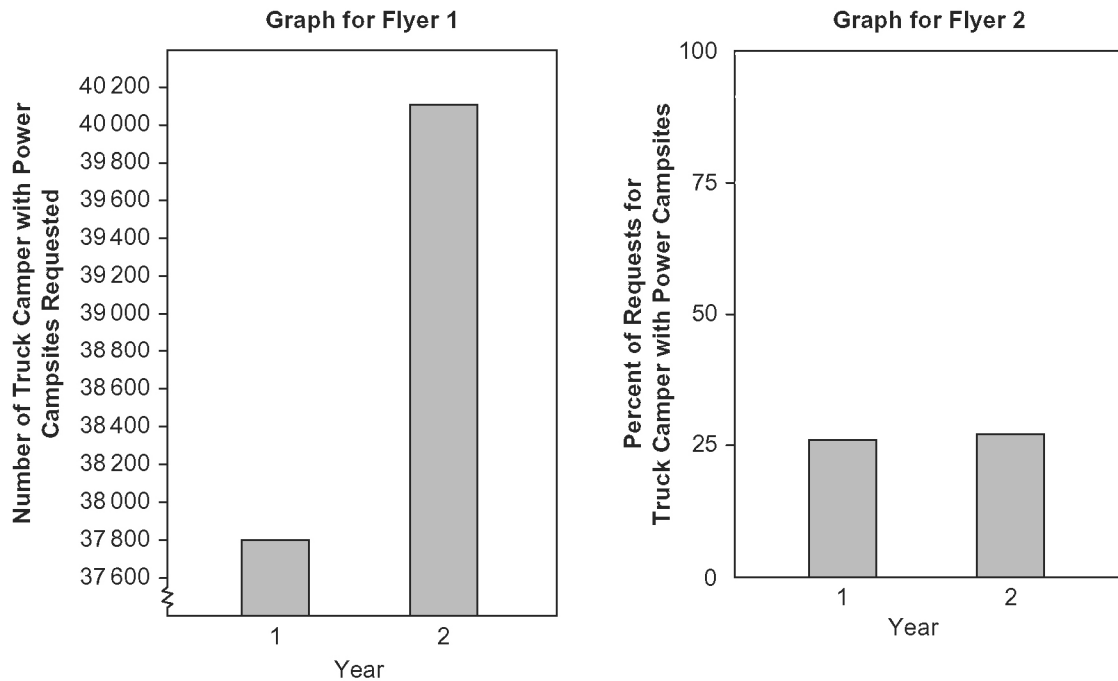


**15.** Which statement is most likely true?

    **A** Flyer 1 is the campground owner's and is not misleading.
    **B** Flyer 1 is the campground owner's and is misleading.
    **C** Flyer 2 is the campground owner's and is not misleading.
    **D** Flyer 2 is the campground owner's and is misleading.

**16.** Another campground has 315 campsites. The ratio of tent to truck camper to trailer campsites is 5:7:9. How many of the campsites are for tent?

    **A** 15          **B** 21          **C** 63          **D** 75
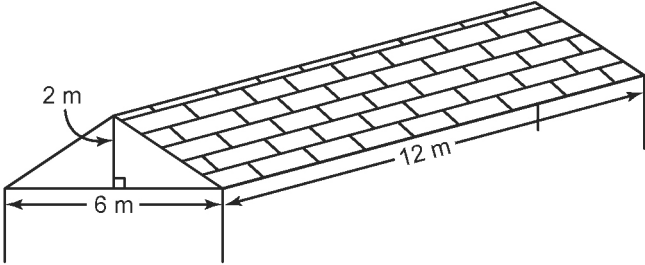
Name: _____     Date: _____

*Use this information to answer #17.*

> **Family Park Adventures**
> $195.00 for 6 days
> $18.00 for 4 bundles of firewood
> $108.00 for 8 people to waterslide
> 27 km in 3 laps of cross-country go-carting

**17.** Which is a correct unit rate for an item listed in Family Park Adventures?

    **A** $35.20 per day
    **B** $4.50 per bundle of firewood
    **C** $18.00 per person to waterslide
    **D** 3 km per lap of cross-country go-carting

*Use this information to answer #18.*

A picnic shelter is getting a new roof. The unseen half of the roof is the same as the visible part.

2 m    12 m    6 m

**18.** The roofing comes in packages of 10 m$^2$. How many packages are needed?

    **A** 6          **B** 7          **C** 8          **D** 9

*Use this information to answer #19.*

A camp counsellor placed pieces of firewood in a pattern with an increasing number of triangles.

Design 1      Design 2      Design 3      Design 4

**19.** Which relation represents the number of pieces of firewood, *f*, in a design based on the design number, *d*?

    **A** $f = d - 2$      **B** $f = d + 2$      **C** $f = 2d - 1$      **D** $f = 2d + 1$

**20.** Every 20th person to enter an amusement park is given a card with a skill-testing question. If the question is answered correctly, the person receives a free lunch. What is the answer to the following skill-testing question?

$$12^2 - (10 + 6) \times 2 \times \frac{1}{4} \div \frac{4}{5}$$

**A** −134          **B** 134          **C** −70          **D** 70

*Use this information to answer #21.*

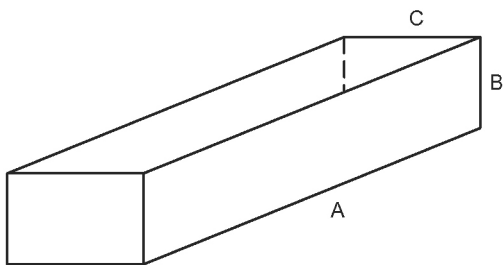A game at an amusement park gave a prize for spinning white and rolling six.
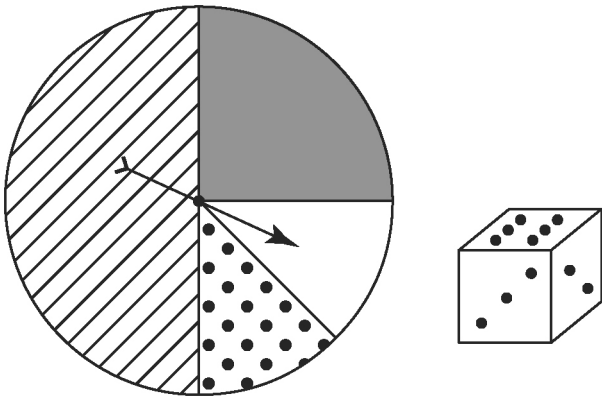


**21.** The probability of getting the winning combination can be calculated using

**A** $\frac{1}{8} \div \frac{1}{6}$          **B** $\frac{1}{8} \times \frac{1}{6}$          **C** $\frac{1}{8} \div \frac{6}{1}$          **D** $\frac{1}{8} \times \frac{6}{1}$

*Use this information to answer #22.*

A rectangular prism shaped tool storage box has edges A, B, and C.



**Numerical Response**

**22.** Edges A, B, and C are in a ratio of 8:2:3. What is the volume of the tool storage box if edge B is 8 cm?
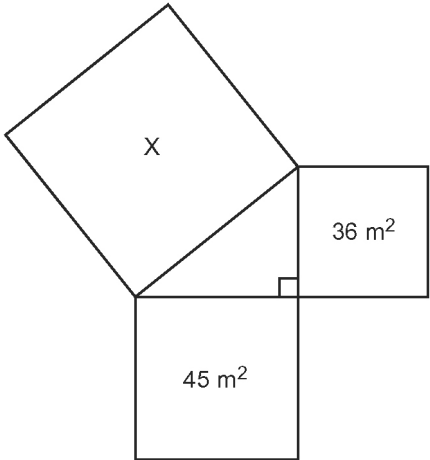
Name: _____ Date: _____

**23.** Water skis with a regular price of $480.00 are on sale for 40% off. GST is 5%. What is the cost of the skis?

    **A** $302.40      **B** $288.00    **C** $201.60     **D** $192.00

**24.** A beach volleyball court is being laid out. One side is $\sqrt{96}$ m. The length of that side is between

    **A** 11 m and 10 m    **B** 10 m and 9 m    **C** 9 m and 8 m    **D** 8 m and 7 m

**25.** Landscapers have created a square flowerbed with an area of 405 cm$^2$. Which is the best approximation of the dimensions, to the nearest tenth of a centimetre?

    **A** 21.0 cm × 2.01 cm      **B** 20.5 cm × 20.5 cm
    **C** 20.1 cm × 20.1 cm      **D** 20.0 cm × 20.0 cm

*Use this information to answer #26.*

In a new recreation park, three square platforms that will be used for different games are planned. The right triangle between them is to be green space.



X

36 m$^2$

45 m$^2$

**26.** What is the area of square platform X?

    **A** 9 m$^2$      **B** 54 m$^2$    **C** 81 m$^2$     **D** 162 m$^2$

**27.** The cost of an addition to the clubhouse at a golf course was 162% higher than expected. The expected cost was $800 000. Which is an expression to calculate the actual cost?

    **A** 162 × 800 000  **B** 16.2 × 800 000  **C** 1.62 × 800 000  **D** 0.162 × 800 000

Name: _____     Date: _____

*Use this information to answer #28–29.*

A concrete culvert runs under the golf club entrance road for a distance of 100 m. It is in the shape of a long rectangular prism with a cylindrical hole running down the middle of it to let water flow through.
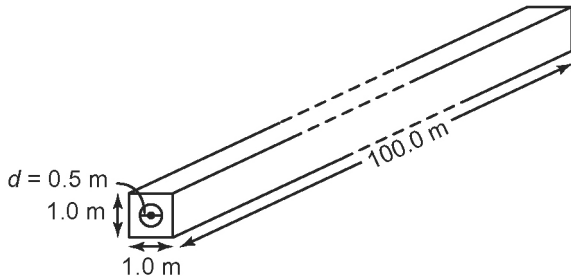


**28.** The outer surface area of the culvert, including both ends, to the nearest tenth of a square metre, is
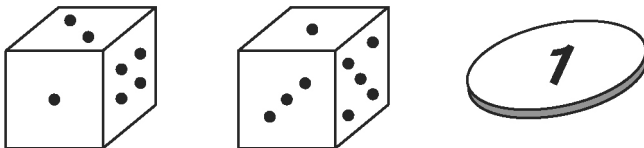
**A** 402.0 m² **B** 401.6 m² **C** 400.0 m² **D** 102.0 m²

**Numerical Response**

**29.** What is the volume of concrete needed for the culvert, to the nearest cubic metre?

*Use this information to answer #30–35.*

Students decide to play a game of chance at a picnic table. The game uses two standard six-sided dice and a chip with 1 on one side and 2 on the other.



**30.** All possible outcomes when the two dice are tossed are called

**A** a simulation          **B** a favourable outcome
**C** a sample space        **D** independent events

**31.** The result when one die and the chip are tossed so that one does not affect the other is called

**A** a simulation          **B** a favourable outcome
**C** a sample space        **D** independent events

**32.** The two dice are tossed at the same time. What is the probability of getting a six on both?

**A** $\dfrac{1}{4}$          **B** $\dfrac{1}{6}$          **C** $\dfrac{1}{12}$          **D** $\dfrac{1}{36}$

**33.** One die and the chip are tossed at the same time. What is the probability of getting even numbers on both?

**A** 25%          **B** 37.5%          **C** 50%          **D** 75%

**34.** The chip is tossed three times in a row. What is the probability of getting a 1 each time?

**A** 12.5%          **B** 25%          **C** 37.5%          **D** 50%

## Numerical Response

**35.** There are 5 boys and 6 girls at the picnic table playing the game of chance. If a team consists of one boy and one girl, how many different teams are possible?

*Use this information to answer #36.*

> Arie has had 42 homeruns so far this season. His goal is 50 homeruns. There are 6 games left.

**36.** Which equation can be used to find the average number of homeruns, *h*, that Arie must get in the remaining games to reach his goal?

**A** $50 + 6h = 42$     **B** $42 + 6h = 50$          **C** $42 - 6h = 50$     **D** $42h + 6 = 50$
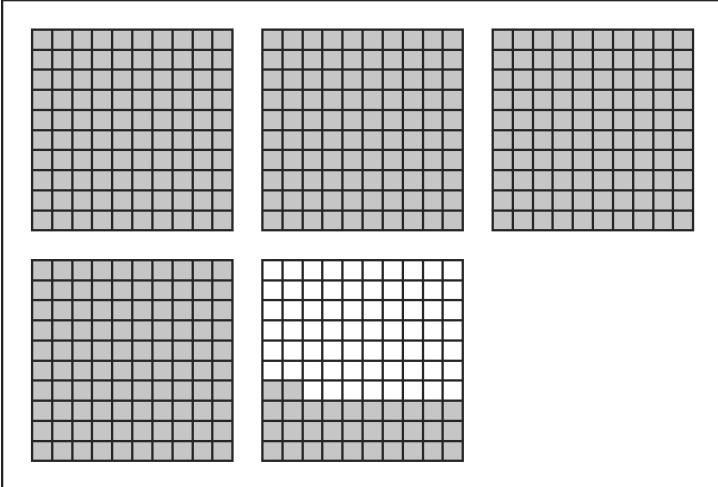
*Use this information to answer #37.*

> For maintaining the greens at the ball stadium, the greenskeeper is paid according to the formula $W = 11h + 13$ where *W* is the wage and *h* is hours worked.

**37.** The greenskeeper's wage was $293.50. How many hours were worked?

**A** 27.5 h          **B** 26.5 h          **C** 25.5 h          **D** 24.5 h

**38.** Several different polygons can be used to tile a patio. To make sure the tiles tessellate, the interior angles where the vertices meet must add up to

**A** 360°          **B** 270°          **C** 180°          **D** 90°

*Use this information to answer #39.*

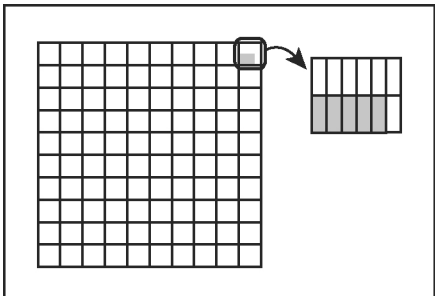Two teams are playing a game in which they draw cards. Team 1 drew this card.

## Numerical Response

**39.** What percent is modelled on the card drawn by Team 1?

*Use this information to answer #40.*

Team 2 drew this card.

**40.** What percent is modelled on the card drawn by Team 2?

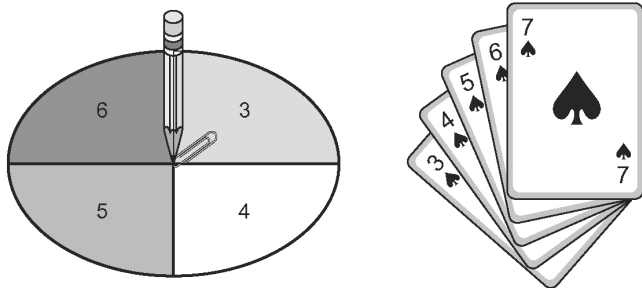**A** $\dfrac{5}{12}$%    **B** $\dfrac{5}{240}$%    **C** 4.16%    **D** 4.16%

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**Connections**
Many concepts learned in one chapter can help us solve problems in another.
Use your mathematical understanding to solve the following problems.

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*Use this information to answer #41–43.*

A trick is based on one spin of a spinner and one draw of a card.



A variation of the trick is based on the sum of the spin and the card drawn.
The sum chart has been started.

| SUM | | Spinner | | | |
|---|---|---|---|---|---|
| | | **3** | **4** | **5** | **6** |
| | **3** | 6 | 7 | 8 | 9 |
| | **4** | 7 | | | |
| **Cards** | **5** | 8 | | | |
| | **6** | 9 | | | |
| | **7** | 10 | | | |

**Numerical Response**

**41.** What is the probability, as a decimal, of spinning 6 and drawing 6?

**42.** Which of the following does **not** represent P(sum of 10)?

**A** $\dfrac{5}{20}$        **B** $\dfrac{1}{5}$        **C** 0.2        **D** 20%

**43.** Which is the same probability as P(sum of 12)?
    **A** P(sum of 13)        **B** P(sum of 11)        **C** P(sum of 8)        **D** P(sum of 7)

*Use this information to answer #44.*

Reba solved the equation $\dfrac{r}{20} - 4 = -3$.

Her work was as follows:

$\dfrac{r}{20} - 4 + 4 = -3 + 4$     Step 1

$\dfrac{r}{20} = -1$     Step 2

$\dfrac{r}{20} \times 20 = -1 \times 20$     Step 3

$r = -20$     Step 4

**44.** Reba's mistake was in

   **A** Step 1      **B** Step 2    **C** Step 3    **D** Step 4

**45.** What is the solution to $5(x - 3) = -5$?

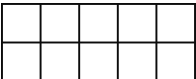   **A** −4      **B** −2    **C** 2    **D** 4

**46.** Which equation represents the following statement?
Seven less than three times a number is fourteen.

   **A** $7 - 3n = 14$    **B** $3n - 7 = 14$    **C** $3(n - 7) = 14$    **D** $3(7 - n) = 14$

**47.** Which regular polygons can not be used to tile a plane?

   **A** triangle    **B** square    **C** hexagon    **D** octagon

**48.** If [grid] is to be shaded to represent $\dfrac{1}{2} \times \dfrac{4}{5}$, how many shaded squares represent the answer?

   **A** 4      **B** 5    **C** 8    **D** 9

**49.** What does $3\dfrac{3}{4} \times 3\dfrac{3}{5}$ equal?

   **A** $6\dfrac{3}{28}$    **B** $9\dfrac{9}{20}$    **C** $10\dfrac{6}{9}$    **D** $13\dfrac{1}{2}$

**Numerical Response**

**50.** There are 24 000 plants in a botanical garden of which $\dfrac{4}{15}$ are roses. How many roses are there?

**51.** What does $3\dfrac{2}{3} \div 2\dfrac{1}{16}$ equal?

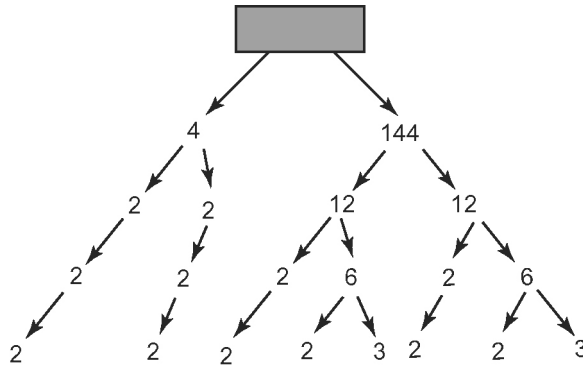    **A** $\dfrac{99}{176}$          **B** $1\dfrac{1}{24}$          **C** $1\dfrac{7}{9}$          **D** $7\dfrac{9}{16}$

*Use this information to answer #52–54.*

A student produced the following diagram. The start number at the top is covered.



**52.** What does the bottom row of the diagram represent?
    **A** prime factors             **B** lowest terms
    **C** factor tree                **D** squares on numbers

**53.** Use the bottom row to determine the square root of the start number at the top of the diagram.
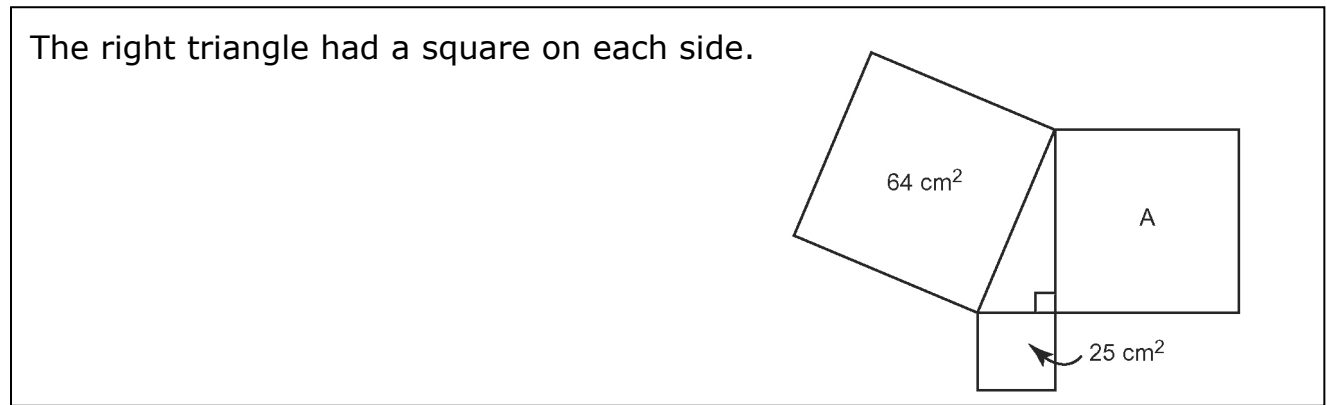    **A** 8             **B** 10             **C** 12             **D** 24

**Numerical Response**

**54.** What is the start number at the top of the diagram?

Name: _____  Date: _____

*Use this information to answer #55.*

The right triangle had a square on each side.

64 cm$^2$

A

25 cm$^2$

**55.** What is the area of square A?

 **A** 89 cm$^2$       **B** 39 cm$^2$      **C** 9 cm$^2$        **D** 3 cm$^2$

*Use this information to answer #56.*

The $\sqrt{x}$ lies somewhere between 4 and 5.

4                                    5
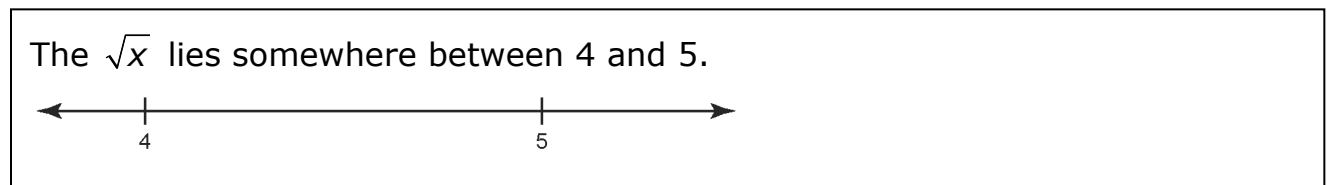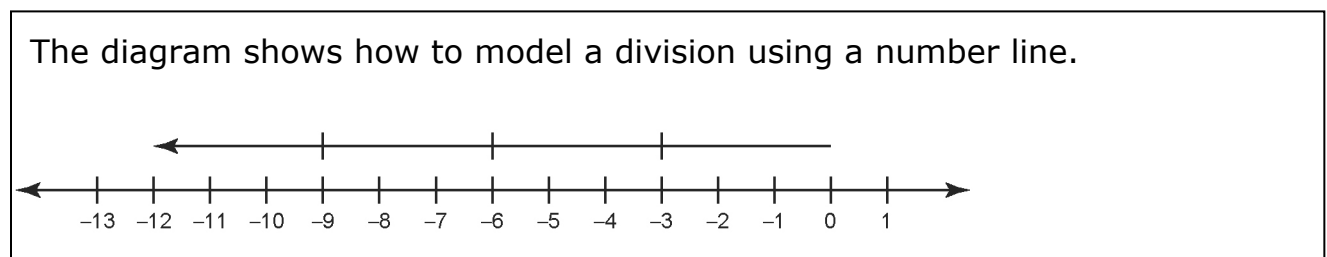
**56.** What is a possible whole number, *x,* with a square root between 4 and 5?

 **A** 9                 **B** 15              **C** 22              **D** 27

**57.** Express $\frac{3}{4}$% as a fraction in lowest terms.

 **A** $\frac{3}{4}$        **B** $\frac{2}{100}$        **C** $\frac{75}{100}$        **D** $\frac{3}{400}$
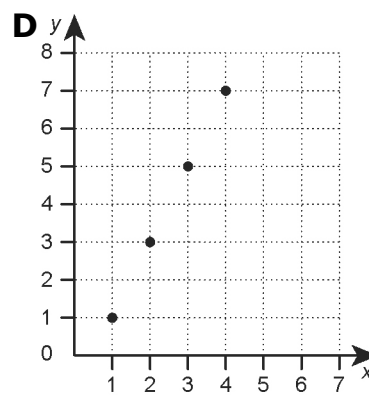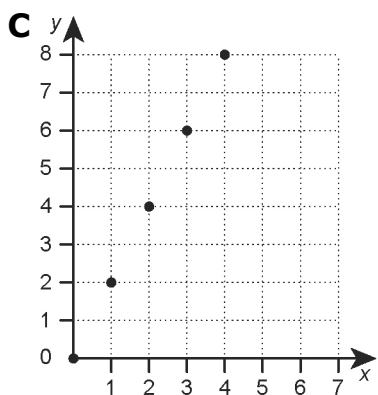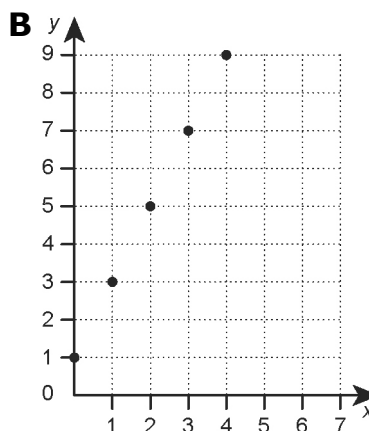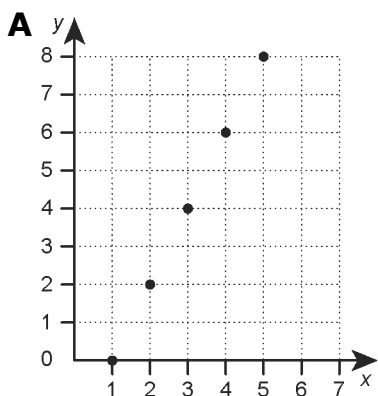
*Use this information to answer #58.*

The diagram shows how to model a division using a number line.

−13  −12  −11  −10  −9  −8  −7  −6  −5  −4  −3  −2  −1  0  1

**58.** Which division is being modelled using the number line?

 **A** 12 ÷ (−4)     **B** 12 ÷ (−4)   **C** −12 ÷ 3        **D** −12 ÷ (−3)

**59.** Which graph represents $y = 2x - 1$ where $x$ is a whole number?

**A**

**B**

**C**

**D**

*Use this information to answer #60.*

To convert a temperature in degrees Fahrenheit ($^{\circ}$F) to degrees Celsius ($^{\circ}$C), the formula $C = \dfrac{5}{9}(F - 32)$ is used.

### Numerical Response

**60.** What is the equivalent temperature in degrees Celsius for a temperature of 59$^{\circ}$F?