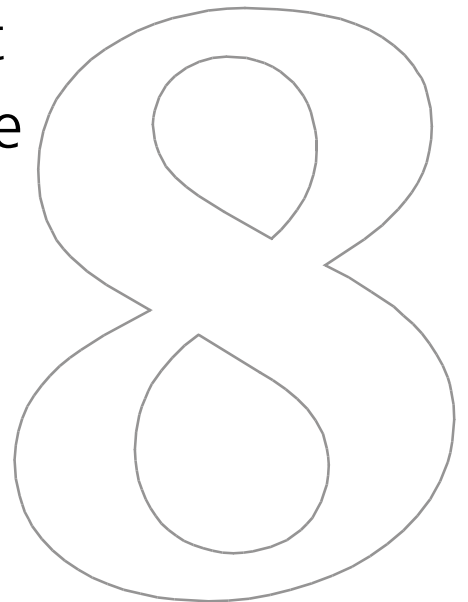


# TIMSS 2003

## MATHEMATICS ITEMS

Released Set  
Eighth Grade







**TIMSS & PIRLS**  
International Study Center  
Lynch School of Education, Boston College

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Unique ID	MS Block	MS Block Seq	Item Type	Key	Trend	Content Domain	Main Topic	Cognitive Domain
M012001	M01	01	MC	A	Yes	Number	Fractions and decimals	Using Concepts
M012002	M01	02	MC	C	Yes	Algebra	Equations and formulas	Using Concepts
M012003	M01	03	MC	D	Yes	Measurement	Tools, techniques, and formulas	Knowing Facts and Procedures
M012004	M01	04	MC	D	Yes	Number	Ratio, proportions, and percent	Solving Routine Problems
M012005	M01	05	MC	B	Yes	Geometry	Congruence and similarity	Using Concepts
M012006	M01	06	MC	C	Yes	Data	Data interpretation	Using Concepts
M012037	M01	07	MC	B	Yes	Data	Data Interpretation	Reasoning
M012038	M01	08	MC	C	Yes	Measurement	Tools, techniques, and formulas	Knowing Facts and Procedures
M012039	M01	09	MC	C	Yes	Geometry	Lines and angles	Solving Routine Problems
M012040	M01	10	MC	B	Yes	Algebra	Equations and formulas	Knowing Facts and Procedures
M012041	M01	11	MC	D	Yes	Number	Fractions and decimals	Solving Routine Problems
M012042	M01	12	MC	E	Yes	Algebra	Algebraic expressions	Knowing Facts and Procedures
M032570	M01	13	MC	A	No	Number	Ratio, proportions, and percent	Using Concepts
M032643	M01	14	MC	C	No	Number	Integers	Using Concepts
M032693	M01	15	CR	X	No	Geometry	Two- and three-dimensional shapes	Solving Routine Problems
M02013	M02	01	MC	A	Yes	Measurement	Tools, techniques, and formulas	Using Concepts
M02014	M02	02	MC	D	Yes	Data	Data interpretation	Using Concepts
M02015	M02	03	MC	A	Yes	Geometry	Congruence and similarity	Reasoning
M02016	M02	04	MC	B	Yes	Number	Fractions and decimals	Knowing Facts and Procedures
M02017	M02	05	MC	B	Yes	Algebra	Patterns	Reasoning
M022251	M02	06	MC	C	Yes	Algebra	Algebraic expressions	Using Concepts
M022185	M02	07	MC	E	Yes	Algebra	Algebraic expressions	Knowing Facts and Procedures
M022188	M02	08	MC	B	Yes	Measurement	Attributes and units	Knowing Facts and Procedures
M022189	M02	09	MC	C	Yes	Data	Data interpretation	Reasoning
M022191	M02	10	MC	A	Yes	Number	Fractions and decimals	Reasoning
M022194	M02	11	MC	D	Yes	Number	Whole numbers	Solving Routine Problems
M022196	M02	12	MC	A	Yes	Algebra	Equations and formulas	Knowing Facts and Procedures
M022198	M02	13	MC	D	Yes	Number	Fractions and decimals	Using Concepts
M022199	M02	14	MC	E	Yes	Number	Fractions and decimals	Knowing Facts and Procedures
M022202	M02	15	CR	X	Yes	Geometry	Lines and angles	Reasoning
M012025	M03	01	MC	D	Yes	Algebra	Relationships	Solving Routine Problems
M012026	M03	02	MC	D	Yes	Geometry	Two- and three-dimensional shapes	Solving Routine Problems
M012027	M03	03	MC	B	Yes	Number	Fractions and decimals	Solving Routine Problems
M012028	M03	04	MC	C	Yes	Number	Whole numbers	Solving Routine Problems
M012029	M03	05	MC	E	Yes	Algebra	Relationships	Reasoning
M012030	M03	06	MC	B	Yes	Measurement	Tools, techniques, and formulas	Solving Routine Problems
M022135	M03	07	MC	A	Yes	Data	Data interpretation	Solving Routine Problems
M022139	M03	08	MC	C	Yes	Number	Ratio, proportions, and percent	Knowing Facts and Procedures
M022142	M03	09	MC	B	Yes	Geometry	Lines and angles	Knowing Facts and Procedures
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M022146	M03	11	MC	E	Yes	Data	Uncertainty and probability	Solving Routine Problems
M022148	M03	12	CR	X	Yes	Measurement	Tools, techniques, and formulas	Solving Routine Problems
M022253	M03	13	CR	X	Yes	Algebra	Equations and formulas	Knowing Facts and Procedures
M022154	M03	14	MC	C	Yes	Geometry	Symmetry and transformations	Reasoning
M022156	M03	15	CR	X	Yes	Number	Fractions and decimals	Knowing Facts and Procedures
M022002	M04	01	MC	A	Yes	Algebra	Algebraic expressions	Solving Routine Problems
M022004	M04	02	MC	C	Yes	Number	Fractions and decimals	Solving Routine Problems
M022005	M04	03	MC	C	Yes	Measurement	Attributes and units	Knowing Facts and Procedures
M022008	M04	04	CR	X	Yes	Algebra	Patterns	Reasoning
M022010	M04	05	MC	A	Yes	Number	Fractions and decimals	Solving Routine Problems
M022012	M04	06	CR	X	Yes	Number	Fractions and decimals	Using Concepts

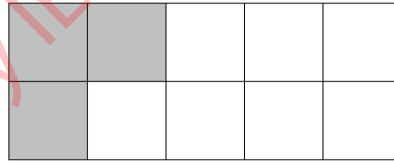


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M022016	M04	08	MC	D	Yes	Geometry	Locations and spatial relationships	Knowing Facts and Procedures
M022252	M04	09	MC	B	Yes	Data	Uncertainty and probability	Reasoning
M022261A	M04	10	CR	X	Yes	Algebra	Patterns	Solving Routine Problems
M022261B	M04	10	CR	X	Yes	Algebra	Patterns	Solving Routine Problems
M022261C	M04	10	CR	X	Yes	Algebra	Patterns	Reasoning
M022227A	M04	11	CR	X	Yes	Measurement	Tools, techniques, and formulas	Solving Routine Problems
M022227B	M04	11	CR	X	Yes	Measurement	Tools, techniques, and formulas	Solving Routine Problems
M022227C	M04	11	CR	X	Yes	Measurement	Tools, techniques, and formulas	Solving Routine Problems
M022127	M04	12	MC	A	Yes	Number	Fractions and decimals	Solving Routine Problems
M032079	M09	01	MC	B	No	Number	Fractions and decimals	Solving Routine Problems
M032652	M09	02	CR	X	No	Number	Whole numbers	Solving Routine Problems
M032228	M09	03	MC	C	No	Number	Ratio, proportions, and percent	Solving Routine Problems
M032044	M09	04	MC	A	No	Algebra	Algebraic expressions	Using Concepts
M032046	M09	05	MC	A	No	Algebra	Equations and formulas	Using Concepts
M032545	M09	06	CR	X	No	Algebra	Equations and formulas	Solving Routine Problems
M032649A	M09	07	CR	X	No	Measurement	Tools, techniques, and formulas	Solving Routine Problems
M032649B	M09	07	CR	X	No	Measurement	Tools, techniques, and formulas	Reasoning
M032533	M09	08	MC	B	No	Number	Ratio, proportions, and percent	Solving Routine Problems
M032678	M09	09	MC	D	No	Measurement	Tools, techniques, and formulas	Using Concepts
M032403	M09	10	CR	X	No	Geometry	Congruence and similarity	Knowing Facts and Procedures
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M032271	M09	14	MC	C	No	Data	Uncertainty and probability	Reasoning
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M032612	M10	02	MC	A	No	Number	Integers	Knowing Facts and Procedures
M032557	M10	03	CR	X	No	Algebra	Algebraic expressions	Reasoning
M032208	M10	04	MC	B	No	Algebra	Equations and formulas	Solving Routine Problems
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M032699	M10	06	MC	C	No	Measurement	Attributes and units	Knowing Facts and Procedures
M032762	M10	07	CR	X	No	Data	Data interpretation	Reasoning
M032763	M10	08	CR	X	No	Data	Data interpretation	Solving Routine Problems
M032764	M10	09	CR	X	No	Data	Data interpretation	Solving Routine Problems
M032647	M10	10	MC	B	No	Measurement	Tools, techniques, and formulas	Reasoning
M032689	M10	11	MC	C	No	Geometry	Two- and three-dimensional shapes	Using Concepts
M032609	M13	01	MC	D	No	Number	Whole numbers	Knowing Facts and Procedures
M032690	M13	02	MC	A	No	Number	Whole numbers	Knowing Facts and Procedures
M032727	M13	03	MC	D	No	Number	Ratio, proportions, and percent	Solving Routine Problems
M032743	M13	04	CR	X	No	Geometry	Symmetry and transformations	Using Concepts
M032744	M13	05	CR	X	No	Algebra	Patterns	Using Concepts
M032745	M13	06	CR	X	No	Geometry	Symmetry and transformations	Reasoning
M032233	M13	07	CR	X	No	Number	Ratio, proportions, and percent	Reasoning
M032670	M13	08	MC	B	No	Number	Fractions and decimals	Using Concepts
M032447	M13	09	MC	A	No	Number	Ratio, proportions, and percent	Knowing Facts and Procedures
M032036	M13	10	MC	C	No	Algebra	Algebraic expressions	Knowing Facts and Procedures
M032728	M13	11	MC	A	No	Algebra	Equations and formulas	Knowing Facts and Procedures
M032732	M13	12	MC	C	No	Measurement	Attributes and units	Knowing Facts and Procedures

## TIMSS 2003

In the figure, how many MORE small squares need to be shaded so that  $\frac{4}{5}$  of the small squares are shaded?

- (A) 5
- (B) 4
- (C) 3
- (D) 2
- (E) 1



Content Domain

**Number**

Main Topic

**Fractions and decimals**

Cognitive Domain

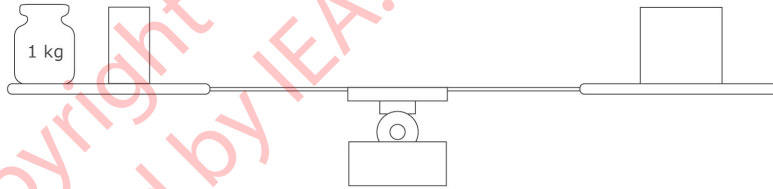
**Using Concepts**

Key

**A**

## TIMSS 2003

The objects on the scale make it balance exactly. On the left pan there is a 1 kg weight (mass) and half a brick. On the right pan there is one brick.



What is the weight (mass) of one brick?

- (A) 0.5 kg
- (B) 1 kg
- (C) 2 kg
- (D) 3 kg

Content Domain

Algebra

Main Topic

Equations and formulas

Cognitive Domain

Using Concepts

Key

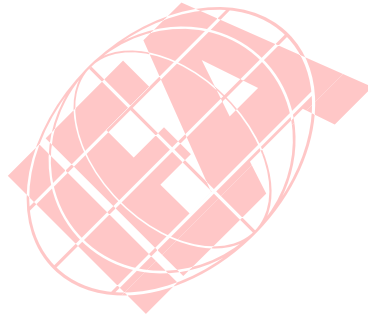
C

## TIMSS 2003

The length of a box is 9 cm to the nearest centimeter. Which of these could be the actual length of the box?

- (A) 10 cm
- (B) 9.9 cm
- (C) 9.6 cm
- (D) 8.6 cm

M012003



Content Domain

**Measurement**

Main Topic

**Tools, techniques, and formulas**

Cognitive Domain

**Knowing Facts and Procedures**

Key

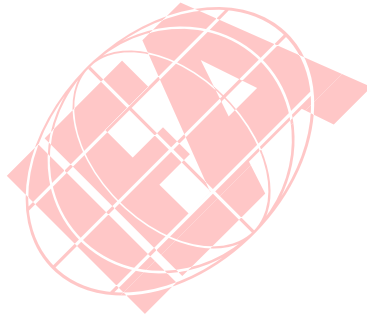
**D**

**TIMSS 2003**

Alice can run 4 laps around a track in the same time that Carol can run 3 laps. When Carol has run 12 laps, how many laps has Alice run?

- (A) 9
- (B) 11
- (C) 13
- (D) 16

M012004



Content Domain

**Number**

Main Topic

**Ratio, proportions, and percent**

Cognitive Domain

**Solving Routine Problems**

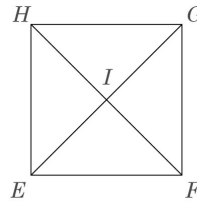
Key

**D**

## TIMSS 2003

In square  $EFGH$ , which of these is FALSE?

- (A)  $\triangle EIF$  and  $\triangle EIH$  are congruent.
- (B)  $\triangle GHI$  and  $\triangle GHF$  are congruent.
- (C)  $\triangle EFH$  and  $\triangle EGH$  are congruent.
- (D)  $\triangle EIF$  and  $\triangle GIH$  are congruent.



Content Domain

Geometry

Main Topic

Congruence and similarity

Cognitive Domain

Using Concepts

Key

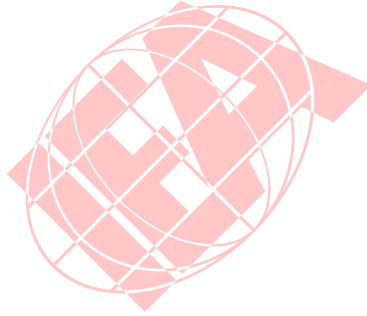
B

## TIMSS 2003

Joe had three test scores of 78, 76, and 74, while Mary had scores of 72, 82, and 74. How did Joe's average (mean) score compare with Mary's average (mean) score?

- (A) Joe's was 1 point higher.
- (B) Joe's was 1 point lower.
- (C) Both averages were the same.
- (D) Joe's was 2 points higher.
- (E) Joe's was 2 points lower.

M012006



Content Domain

Data

Main Topic

Data interpretation

Cognitive Domain

Using Concepts

Key

C

## TIMSS 2003

The table shows scores for a class on a 10-point test.

Test Score	Tally	Frequency
4	/	1
5	///	3
6	//// /	6
7	//	2
8	////	4
9	///	3
10	/	1

How many in the class made a score greater than 7?

- (A) 2
- (B) 8
- (C) 10
- (D) 12
- (E) 20

M012037

Content Domain

Data

Main Topic

Data Interpretation

Cognitive Domain

Reasoning

Key

B



## TIMSS 2003

Content Domain

Measurement

Main Topic

Tools, techniques, and formulas

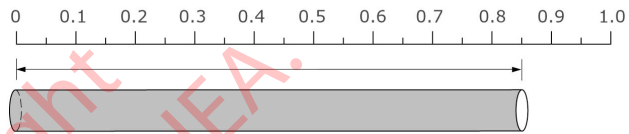
Cognitive Domain

Knowing Facts and Procedures

Key

C

Meters (m)



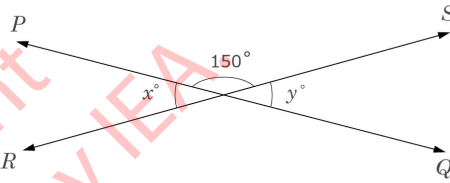
What is the length of the pipe being measured?

- (A) 0.085 m
- (B) 0.805 m
- (C) 0.85 m
- (D) 8.5 m

M012038

## TIMSS 2003

In the figure,  $PQ$  and  $RS$  are intersecting straight lines.



What is the value of  $x + y$ ?

- (A) 15
- (B) 30
- (C) 60
- (D) 180
- (E) 300

M012039

Content Domain

Geometry

Main Topic

Lines and angles

Cognitive Domain

Solving Routine Problems

Key

C

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## TIMSS 2003

Content Domain

Algebra

Main Topic

Equations and formulas

Cognitive Domain

Knowing Facts and  
Procedures

Key

B

If  $\frac{12}{n} = \frac{36}{21}$ , then  $n$  equals

- (A) 3
- (B) 7
- (C) 36
- (D) 63

M012040

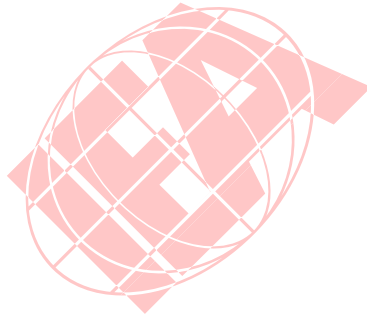


## TIMSS 2003

In a group of children, 16 have birthdays during the first half of the year, and 14 have birthdays during the second half of the year. What fraction of the group have birthdays during the first half of the year?

- (A)  $\frac{14}{30}$
- (B)  $\frac{14}{16}$
- (C)  $\frac{16}{14}$
- (D)  $\frac{16}{30}$
- (E)  $\frac{30}{16}$

M012041



Content Domain

Number

Main Topic

Fractions and decimals

Cognitive Domain

Solving Routine Problems

Key

D

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## TIMSS 2003

If  $x = -3$ , what is the value of  $-3x$ ?

- (A) -9
- (B) -6
- (C) -1
- (D) 1
- (E) 9

M012042

Content Domain

Algebra

Main Topic

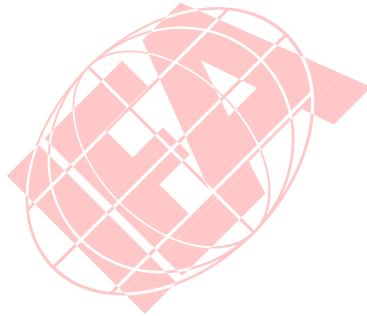
Algebraic expressions

Cognitive Domain

Knowing Facts and Procedures

Key

E



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## TIMSS 2003

Content Domain

Number

Main Topic

Ratio, proportions, and percent

Cognitive Domain

Using Concepts

Key

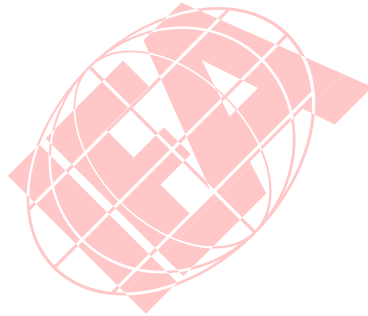
A

At a play,  $\frac{3}{25}$  of the people in the audience were children.

What percent of the audience was this?

- (A) 12%
- (B) 3%
- (C) 0.3%
- (D) 0.12%

M032570



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## TIMSS 2003

If  $n$  is a negative integer, which of these is the largest number?

- (A)  $3 + n$
- (B)  $3 \times n$
- (C)  $3 - n$
- (D)  $3 \div n$

M032643

Content Domain

Number

Main Topic

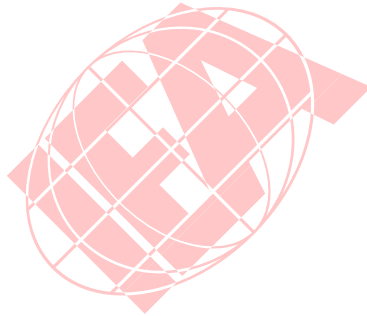
Integers

Cognitive Domain

Using Concepts

Key

C



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## TIMSS 2003

Content Domain

**Geometry**

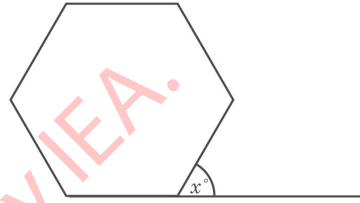
Main Topic

**Two- and three-dimensional shapes**

Cognitive Domain

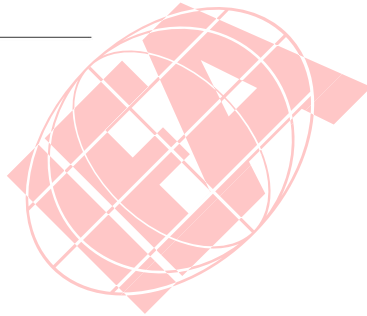
**Solving Routine Problems**

Key

**See scoring guide**

The figure above is a regular hexagon. What is the value of  $x$ ?

Answer: \_\_\_\_\_



M032693

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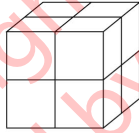


Code	Response	Item: M032693
	<b>Correct Response</b>	
<b>10</b>	60 degrees	
	<b>Incorrect Response</b>	
<b>70</b>	120 degrees	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

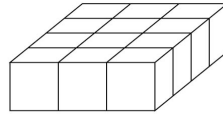
**TIMSS 2003**

All the small blocks are the same size. Which stack of blocks has a different volume from the others?

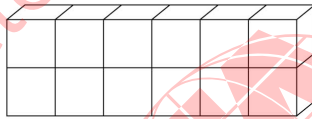
(A)



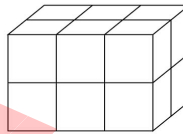
(B)



(C)



(D)



M012013

Content Domain

**Measurement**

Main Topic

**Tools, techniques, and formulas**

Cognitive Domain

**Using Concepts**

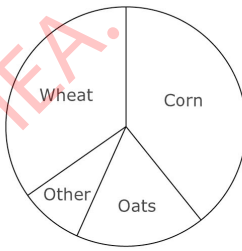
Key

**A**

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## TIMSS 2003

The graph shows the distribution of crops grown in a certain country.



According to the information in the graph, which of these statements is true?

- (A) More oats are grown than wheat.
- (B) Corn is more than one-half of the country's crop.
- (C) Oats are more than one-third of the country's crop.
- (D) The total crop of oats and wheat is greater than the corn crop.

Content Domain

**Data**

Main Topic

**Data interpretation**

Cognitive Domain

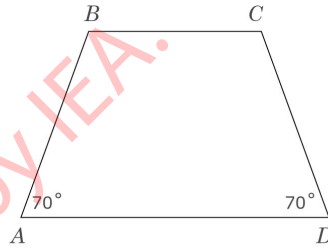
**Using Concepts**

Key

**D**

## TIMSS 2003

$ABCD$  is a trapezoid.



Another trapezoid,  $GHIJ$  (not shown), is congruent (the same size and shape) to  $ABCD$ . Angles  $G$  and  $J$  each measure  $70^\circ$ . Which of these could be true?

- (A)  $GH = AB$
- (B) Angle  $H$  is a right angle.
- (C) All sides of  $GHIJ$  are the same length.
- (D) The perimeter of  $GHIJ$  is 3 times the perimeter of  $ABCD$ .
- (E) The area of  $GHIJ$  is less than the area of  $ABCD$ .

Content Domain

Geometry

Main Topic

Congruence and similarity

Cognitive Domain

Reasoning

Key

A

## TIMSS 2003

In which of these pairs of numbers is 2.25 larger than the first number but smaller than the second number?

- (A) 1 and 2
- (B) 2 and  $\frac{5}{2}$
- (C)  $\frac{5}{2}$  and  $\frac{11}{4}$
- (D)  $\frac{11}{4}$  and 3

M012016



Content Domain

**Number**

Main Topic

**Fractions and decimals**

Cognitive Domain

**Knowing Facts and Procedures**

Key

**B**

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TIMSS 2003

Matchsticks are arranged as shown in the figures.

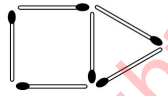


Figure 1

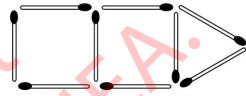


Figure 2

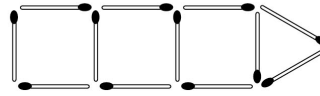


Figure 3

If the pattern is continued, how many matchsticks would be used to make Figure 10?

- (A) 30
- (B) 33
- (C) 36
- (D) 39
- (E) 42

M012017

Content Domain

Algebra

Main Topic

Patterns

Cognitive Domain

Reasoning

Key

B

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## TIMSS 2003

Content Domain

Algebra

Main Topic

Algebraic expressions

Cognitive Domain

Using Concepts

Key

C

Graham has twice as many books as Bob. Chan has six more books than Bob. If Bob has  $x$  books, which of the following represents the total number of books the three boys have?

- (A)  $3x + 6$
- (B)  $3x + 8$
- (C)  $4x + 6$
- (D)  $5x + 6$
- (E)  $8x + 2$

M022251



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## TIMSS 2003

Content Domain

Algebra

Main Topic

Algebraic expressions

Cognitive Domain

Knowing Facts and Procedures

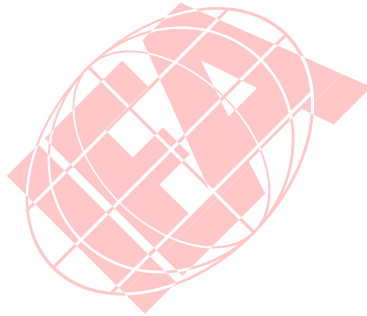
Key

E

Subtract:  $\frac{3x}{7} - \frac{x}{7} =$ 

- (A)  $\frac{2}{7}$
- (B) 3
- (C)  $2x$
- (D)  $\frac{x}{7}$
- (E)  $\frac{2x}{7}$

M022185



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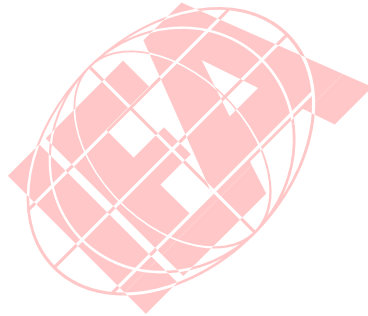


## TIMSS 2003

Which of these is the LEAST amount of time?

- (A) 1 day
- (B) 20 hours
- (C) 1800 minutes
- (D) 90 000 seconds

M022188



Content Domain

**Measurement**

Main Topic

**Attributes and units**

Cognitive Domain

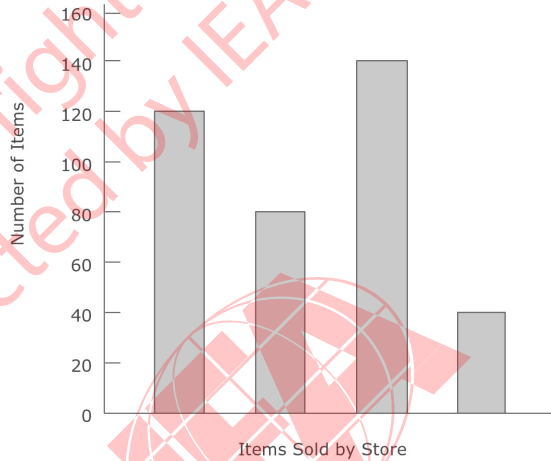
**Knowing Facts and Procedures**

Key

**B**

## TIMSS 2003

The graph shows the number of pens, pencils, rulers, and erasers sold by a store in one week.



The names of the items are missing from the graph. Pens were the item most often sold, and fewer erasers than any other item were sold. More pencils than rulers were sold. How many pencils were sold?

- (A) 40
- (B) 80
- (C) 120
- (D) 140

Content Domain

Data

Main Topic

Data interpretation

Cognitive Domain

Reasoning

Key

C

## TIMSS 2003

Content Domain

Number

Main Topic

Fractions and decimals

Cognitive Domain

Reasoning

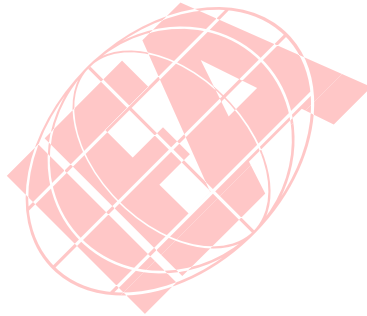
Key

A

Two-thirds of the people present at the beginning of a meeting are men. Nobody leaves but 10 more men and 10 more women arrive at the meeting. Which of the following statements is true?

- (A) There would then be more men than women at the meeting.
- (B) There would then be the same number of men as there are women at the meeting.
- (C) There would then be more women than men at the meeting.
- (D) From the information given, you cannot tell whether there would be more women or men.

M022191



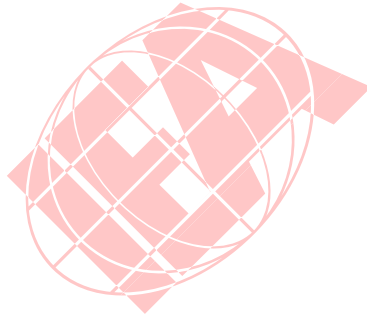
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## TIMSS 2003

About 7000 copies of a magazine are sold each week. Approximately how many magazines are sold each year?

- (A) 8400
- (B) 35 000
- (C) 84 000
- (D) 350 000
- (E) 3 500 000

M022194



Content Domain

Number

Main Topic

Whole numbers

Cognitive Domain

Solving Routine Problems

Key

D

## TIMSS 2003

If  $L = 4$  when  $K = 6$  and  $M = 24$ , which of the following is true?

- (A)  $L = \frac{M}{K}$
- (B)  $L = \frac{K}{M}$
- (C)  $L = KM$
- (D)  $L = K + M$
- (E)  $L = M - K$

M022196

Content Domain

Algebra

Main Topic

Equations and formulas

Cognitive Domain

Knowing Facts and Procedures

Key

A

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## TIMSS 2003

In which list are the numbers ordered from greatest to least?

- (A) 0.233, 0.3, 0.32, 0.332
- (B) 0.3, 0.32, 0.332, 0.233
- (C) 0.32, 0.233, 0.332, 0.3
- (D) 0.332, 0.32, 0.3, 0.233

M022198

Content Domain

Number

Main Topic

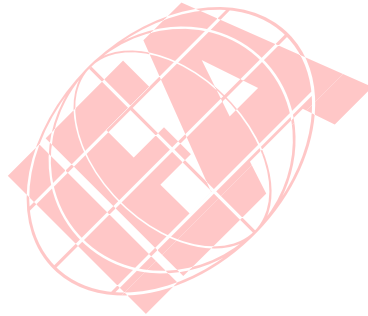
Fractions and decimals

Cognitive Domain

Using Concepts

Key

D



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## TIMSS 2003

Content Domain

Number

Main Topic

Fractions and decimals

Cognitive Domain

Knowing Facts and  
Procedures

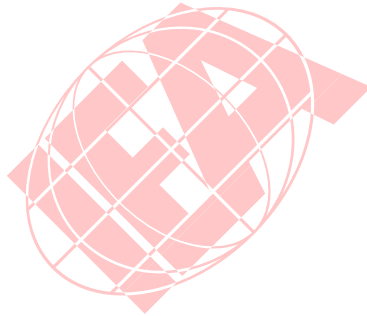
Key

E

$$\frac{3}{5} + \left( \frac{3}{10} \times \frac{4}{15} \right) =$$

- (A)  $\frac{3}{51}$
- (B)  $\frac{1}{6}$
- (C)  $\frac{6}{25}$
- (D)  $\frac{11}{25}$
- (E)  $\frac{17}{25}$

M022199



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## TIMSS 2003

Content Domain

Geometry

Main Topic

Lines and angles

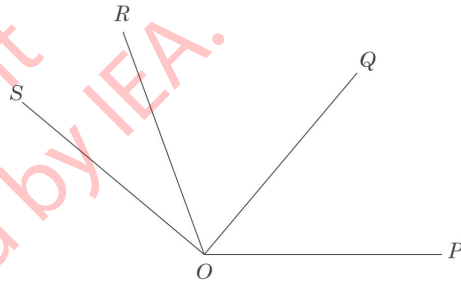
Cognitive Domain

Reasoning

Key

See scoring guide

In the figure, the measure of  $\angle POR$  is  $110^\circ$ , the measure of  $\angle QOS$  is  $90^\circ$ , and the measure of  $\angle POS$  is  $140^\circ$ .



What is the measure of  $\angle QOR$ ?

Answer: \_\_\_\_\_

M022202

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**Note:** There is no distinction made between responses with or without units.

Code	Response	Item: M022202
	<b>Correct Response</b>	
10	60	
	<b>Incorrect Response</b>	
70	30 OR 50 [140° – 110° or 140° – 90°]	
71	55 [110 ÷ 2]	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	

## TIMSS 2003

Content Domain

Algebra

Main Topic

Relationships

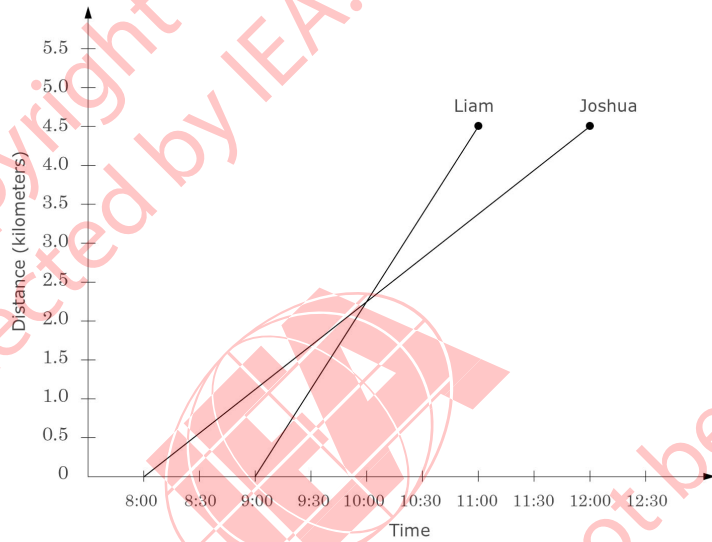
Cognitive Domain

Solving Routine Problems

Key

D

The graph represents the distance and time of a hike taken by Joshua and Liam.

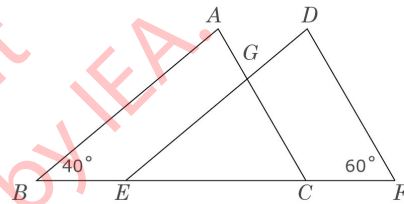


If they both started from the same place and walked in the same direction, at what time did they meet?

- (A) 8:00
- (B) 8:30
- (C) 9:00
- (D) 10:00
- (E) 11:00

## TIMSS 2003

In this figure, triangles  $ABC$  and  $DEF$  are congruent with  $BC = EF$ .



What is the measure of angle  $EGC$ ?

- (A)  $20^\circ$
- (B)  $40^\circ$
- (C)  $60^\circ$
- (D)  $80^\circ$
- (E)  $100^\circ$

Content Domain

Geometry

Main Topic

Two- and three-dimensional shapes

Cognitive Domain

Solving Routine Problems

Key

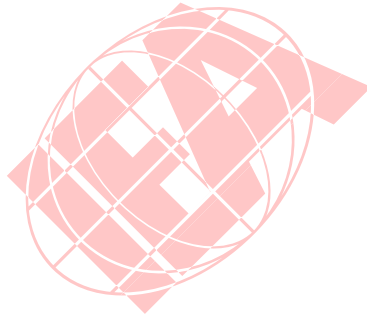
D

## TIMSS 2003

What fraction of an hour has passed between 1:10 a.m. and 1:30 a.m.?

- (A)  $\frac{1}{5}$
- (B)  $\frac{1}{3}$
- (C)  $\frac{1}{2}$
- (D)  $\frac{2}{3}$
- (E)  $\frac{3}{4}$

M012027



Content Domain

Number

Main Topic

Fractions and decimals

Cognitive Domain

Solving Routine Problems

Key

B

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## TIMSS 2003

Content Domain

Number

Main Topic

Whole numbers

Cognitive Domain

Solving Routine Problems

Key

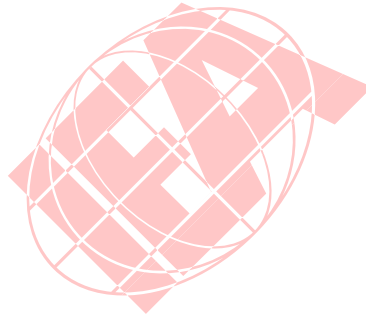
C

9	1	4	5
---	---	---	---

The four digits above are to be arranged from largest to smallest to form a four-digit number. The same four digits are then to be arranged from smallest to largest to form another four-digit number. What is the difference between the two resulting four-digit numbers?

- (A) 3726
- (B) 4726
- (C) 8082
- (D) 8182
- (E) 8192

M012028



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**TIMSS 2003**

Content Domain

**Algebra**

Main Topic

**Relationships**

Cognitive Domain

**Reasoning**

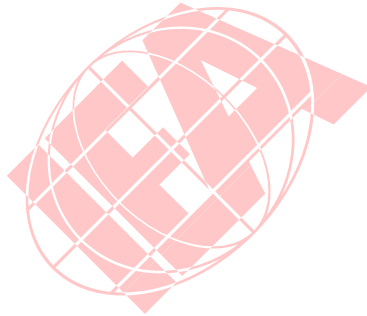
Key

**E** $(3, 6)$ ,  $(6, 15)$ ,  $(8, 21)$ 

Which of these describes how to get the second number from the first number in every ordered pair above?

- (A) Add 3
- (B) Subtract 3
- (C) Multiply by 2
- (D) Multiply by 2 and then add 3
- (E) Multiply by 3 and then subtract 3

M012029



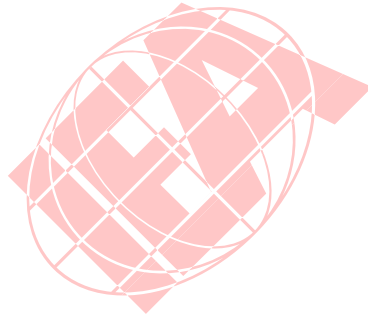
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## TIMSS 2003

A thin wire 20 centimeters long is formed into a rectangle. If the width of this rectangle is 4 centimeters, what is its length?

- (A) 5 centimeters
- (B) 6 centimeters
- (C) 12 centimeters
- (D) 16 centimeters

M012030



Content Domain

**Measurement**

Main Topic

**Tools, techniques, and formulas**

Cognitive Domain

**Solving Routine Problems**

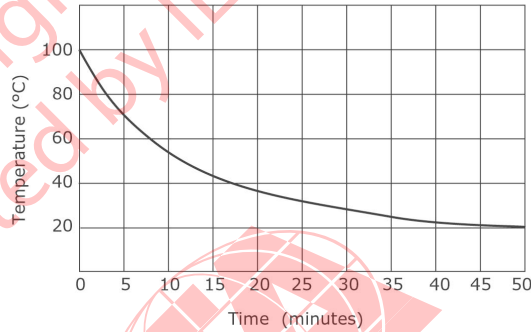
Key

**B**

TIMSS 2003

A beaker of water which has reached boiling point is allowed to cool. The temperature of the water is recorded at five minute intervals, and a temperature-time graph is drawn.

Cooling Curve



About how many minutes did it take for the water to cool the first 20 degrees?

- (A) 3
- (B) 8
- (C) 37
- (D) 50

M022135

Content Domain

Data

Main Topic

Data interpretation

Cognitive Domain

Solving Routine Problems

Key

A

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## TIMSS 2003

When a new highway is built, the average time it takes a bus to travel from one town to another is reduced from 25 minutes to 20 minutes. What is the percent decrease in time taken to travel between the two towns?

- (A) 4%
- (B) 5%
- (C) 20%
- (D) 25%

M022139



Content Domain

Number

Main Topic

Ratio, proportions, and percent

Cognitive Domain

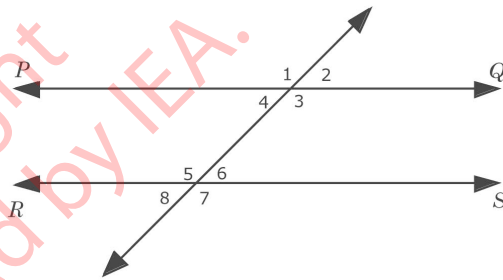
Knowing Facts and Procedures

Key

C

## TIMSS 2003

In this figure,  $PQ$  and  $RS$  are parallel.



Of the following, which pair of angles has the sum of  $180^\circ$ ?

- (A)  $\angle 5$  and  $\angle 7$
- (B)  $\angle 3$  and  $\angle 6$
- (C)  $\angle 1$  and  $\angle 5$
- (D)  $\angle 1$  and  $\angle 7$
- (E)  $\angle 2$  and  $\angle 8$

M022142

Content Domain

Geometry

Main Topic

Lines and angles

Cognitive Domain

Knowing Facts and Procedures

Key

B

## TIMSS 2003

Which of the following is 78.2437 rounded to the nearest hundredth?

- (A) 100
- (B) 80
- (C) 78.2
- (D) 78.24
- (E) 78.244

M022144

Content Domain

Number

Main Topic

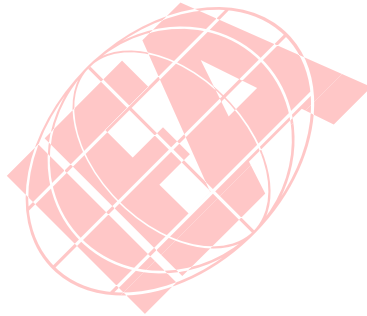
Fractions and decimals

Cognitive Domain

Using Concepts

Key

D



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## TIMSS 2003

Content Domain

Data

Main Topic

Uncertainty and probability

Cognitive Domain

Solving Routine Problems

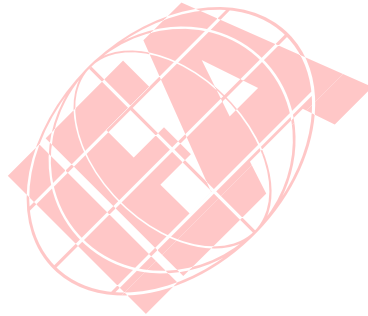
Key

E

In an eighth-grade class of 30 students, the probability that a student chosen at random will be less than 13 years old is  $\frac{1}{5}$ . How many students in the class are less than 13 years old?

- (A) Two
- (B) Three
- (C) Four
- (D) Five
- (E) Six

M022146



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**TIMSS 2003**

Kris begins her homework at 6:40. If it takes Kris three-quarters of an hour to do her homework, at what time will she finish?

Answer: \_\_\_\_\_

M022148

Content Domain

**Measurement**

Main Topic

**Tools, techniques, and formulas**

Cognitive Domain

**Solving Routine Problems**

Key

**See scoring guide**

Code	Response	Item: M022148
	<b>Correct Response</b>	
<b>10</b>	7:25	
<b>19</b>	Other response equivalent to 7:25	
	<b>Incorrect Response</b>	
<b>70</b>	7:20	
<b>71</b>	7:30	
<b>72</b>	6:25	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

**TIMSS 2003**

If  $4(x + 5) = 80$ , then  $x =$

Answer: \_\_\_\_\_

M022253

Content Domain

**Algebra**

Main Topic

**Equations and formulas**

Cognitive Domain

**Knowing Facts and Procedures**

Key

**See scoring guide**

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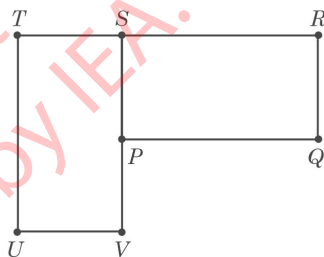
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Code	Response	Item: M022253
	<b>Correct Response</b>	
10	15	
	<b>Incorrect Response</b>	
70	25	$[100 \div 4]$
71	60	$[80 - (4 \times 5)]$
72	71	$[80 - 4 - 5]$
73	Any expression or equation, other than $x = 15$ , containing $x$ .	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	



TIMSS 2003

Rectangle  $PQRS$  can be rotated (turned) onto rectangle  $UVST$ .



What point is the center of rotation?

- (A)  $P$
- (B)  $R$
- (C)  $S$
- (D)  $T$
- (E)  $V$

M022154

Content Domain

Geometry

Main Topic

Symmetry and transformations

Cognitive Domain

Reasoning

Key

C

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## TIMSS 2003

Content Domain

**Number**

Main Topic

**Fractions and decimals**

Cognitive Domain

**Knowing Facts and Procedures**

Key

**See scoring guide**

A scoop holds  $\frac{1}{5}$  kg of flour. How many scoops of flour are needed to fill a bag with 6 kg of flour?

Answer: \_\_\_\_\_

M022156



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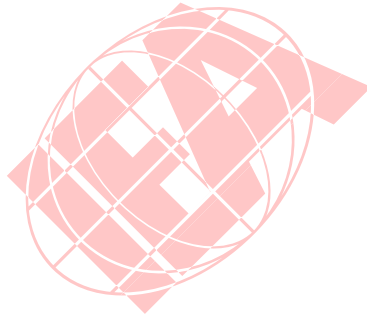
Code	Response	Item: M022156
	<b>Correct Response</b>	
<b>10</b>	30	
	<b>Incorrect Response</b>	
<b>70</b>	30 kg	[incorrect unit]
<b>71</b>	6/5	[6 x 1/5]
<b>72</b>	4	[4/5 more needed to complete 1 kg]
<b>73</b>	5	[5 scoops = 1 kg flour]
<b>74</b>	6	[from stem]
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

Sam wanted to find three consecutive even numbers that add up to 84.  
He wrote the equation  $k + (k + 2) + (k + 4) = 84$ .  
What does the letter  $k$  represent?

- (A) The least of the three even numbers
- (B) The middle even number
- (C) The greatest of the three even numbers
- (D) The average of the three even numbers

M022002



Content Domain

Algebra

Main Topic

Algebraic expressions

Cognitive Domain

Solving Routine Problems

Key

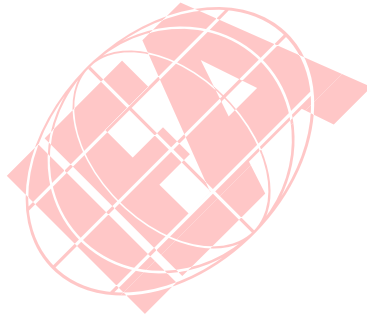
A

## TIMSS 2003

A teacher and a doctor each have 45 books. If  $\frac{4}{5}$  of the teacher's books and  $\frac{2}{3}$  of the doctor's books are novels, how many more novels does the teacher have than the doctor?

- (A) 2
- (B) 3
- (C) 6
- (D) 30
- (E) 36

M022004



Content Domain

Number

Main Topic

Fractions and decimals

Cognitive Domain

Solving Routine Problems

Key

C

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**TIMSS 2003**

Content Domain

**Measurement**

Main Topic

**Attributes and units**

Cognitive Domain

**Knowing Facts and Procedures**

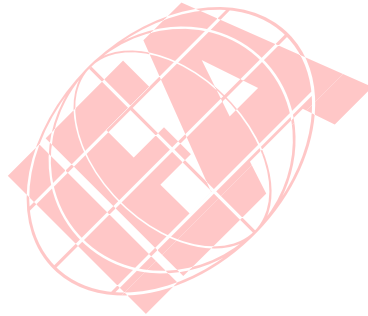
Key

**C**

The number of 250 milliliter bottles that can be filled from 400 liters of water is

- (A) 16
- (B) 160
- (C) 1600
- (D) 16 000

M022005



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## TIMSS 2003

The numbers in the sequence 7, 11, 15, 19, 23, ... increase by four. The numbers in the sequence 1, 10, 19, 28, 37, ... increase by nine. The number 19 is in both sequences. If the two sequences are continued, what is the next number that is in BOTH the first and the second sequences?

Answer: \_\_\_\_\_

M022008

Content Domain

**Algebra**

Main Topic

**Patterns**

Cognitive Domain

**Reasoning**

Key

**See scoring guide**

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Code	Response	Item: M022008
	<b>Correct Response</b>	
<b>10</b>	55	
	<b>Incorrect Response</b>	
<b>70</b>	27 AND 46 [23 + 4 and 37 + 9]	
<b>71</b>	Either 27 OR 46	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	



## TIMSS 2003

Alice ran a race in 49.86 seconds. Betty ran the same race in 52.30 seconds. How much longer did it take Betty to run the race than Alice?

- (A) 2.44 seconds
- (B) 2.54 seconds
- (C) 3.56 seconds
- (D) 3.76 seconds

M022010



Content Domain

Number

Main Topic

Fractions and decimals

Cognitive Domain

Solving Routine Problems

Key

A

## TIMSS 2003

Content Domain

**Number**

Main Topic

**Fractions and decimals**

Cognitive Domain

**Using Concepts**

Key

**See scoring guide**

Write a fraction that is less than  $\frac{4}{9}$ .

Answer: \_\_\_\_\_

M022012



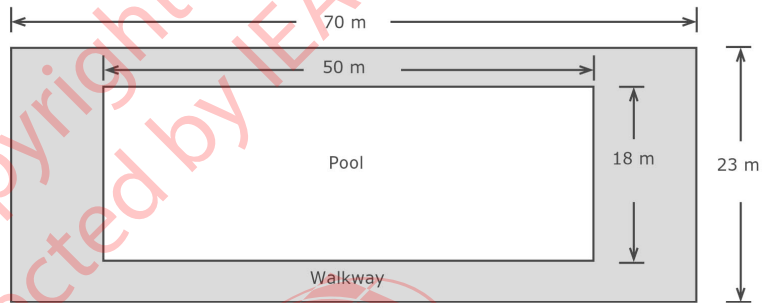
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Code	Response	Item: M022012
	<b>Correct Response</b>	
<b>10</b>	A fraction with numerator smaller than 4 and denominator equal to 9, includes $3/9 = 1/3$ OR $1/3$	
<b>11</b>	A fraction with numerator equal to 4 and denominator greater than 9, includes $4/10 = 2/5$ OR $2/5$	
<b>12</b>	$3/8$	
<b>19</b>	Other correct fraction	
	<b>Incorrect Response</b>	
<b>70</b>	$5/9$	
<b>71</b>	$2/3$	
<b>72</b>	Any fraction equivalent to $4/9$	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

A rectangular shaped swimming pool has a paved walkway around it as shown.



What is the area of the paved walkway?

- (A)  $100 \text{ m}^2$
- (B)  $161 \text{ m}^2$
- (C)  $710 \text{ m}^2$
- (D)  $1610 \text{ m}^2$

Content Domain

Measurement

Main Topic

Tools, techniques, and formulas

Cognitive Domain

Knowing Facts and Procedures

Key

C

## TIMSS 2003

A straight line passes through the points (2,3) and (4,7). Which of these points is also on the line?

- (A) (0,2)
- (B) (1,2)
- (C) (2,4)
- (D) (3,5)
- (E) (4,5)

M022016



Content Domain

**Geometry**

Main Topic

**Locations and spatial relationships**

Cognitive Domain

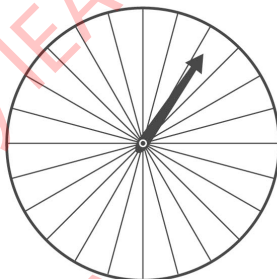
**Knowing Facts and Procedures**

Key

**D**

## TIMSS 2003

The figure below shows a spinner with 24 sectors. When someone spins the arrow, it is equally likely to stop on any sector.



$\frac{1}{8}$  of the sectors are blue,  $\frac{1}{24}$  are purple,  $\frac{1}{2}$  are orange, and  $\frac{1}{3}$  are red. If a person spins the arrow, on which color sector is the spinner LEAST likely to stop?

- (A) blue
- (B) purple
- (C) orange
- (D) red

M022252

Content Domain

Data

Main Topic

Uncertainty and probability

Cognitive Domain

Reasoning

Key

B

TIMSS 2003

The three figures below are divided into small congruent triangles.



Figure 1

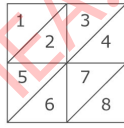


Figure 2

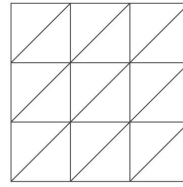


Figure 3

- A. Complete the table below. First, fill in how many small triangles make up Figure 3. Then, find the number of small triangles that would be needed for the 4th figure if the sequence of figures is extended.

Figure	Number of Small Triangles
1	2
2	8
3	
4	

- B. The sequence of figures is extended to the 7th figure. How many small triangles would be needed for Figure 7?

Answer: \_\_\_\_\_

- C. The sequence of figures is extended to the 50th figure. Explain a way to find the number of small triangles in the 50th figure that does not involve drawing it and counting the number of triangles.

Content Domain

Algebra

Main Topic

Patterns

Cognitive Domain

Solving Routine Problems

Key

See scoring guide

**A: Codes for Numbers of Triangles**

Code	Response	Item: M022261A
	<b>Correct Response</b>	
10	18 AND 32	
	<b>Incorrect Response</b>	
70	18 and any number other than 32	
71	18 and no numerical response for the 4 <sup>th</sup> figure	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	



TIMSS 2003

The three figures below are divided into small congruent triangles.



Figure 1



Figure 2

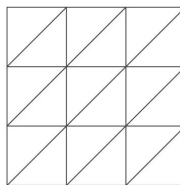


Figure 3

- A. Complete the table below. First, fill in how many small triangles make up Figure 3. Then, find the number of small triangles that would be needed for the 4th figure if the sequence of figures is extended.

Figure	Number of Small Triangles
1	2
2	8
3	
4	

- B. The sequence of figures is extended to the 7th figure. How many small triangles would be needed for Figure 7?

Answer: \_\_\_\_\_

- C. The sequence of figures is extended to the 50th figure. Explain a way to find the number of small triangles in the 50th figure that does not involve drawing it and counting the number of triangles.

Content Domain

Algebra

Main Topic

Patterns

Cognitive Domain

Solving Routine Problems

Key

See scoring guide

**B: Codes for Number of Triangles in Figure 7**

Code	Response	Item: M022261B
	<b>Correct Response</b>	
10	98	
	<b>Incorrect Response</b>	
70	49	[Multiplies 7 x 7]
71	58	[Series is 2, 8, 18, 28, 38...7 <sup>th</sup> term is 58]
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	

TIMSS 2003

The three figures below are divided into small congruent triangles.



Figure 1



Figure 2

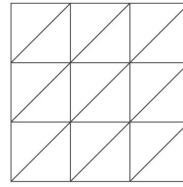


Figure 3

A. Complete the table below. First, fill in how many small triangles make up Figure 3. Then, find the number of small triangles that would be needed for the 4th figure if the sequence of figures is extended.

Figure	Number of Small Triangles
1	2
2	8
3	
4	

B. The sequence of figures is extended to the 7th figure. How many small triangles would be needed for Figure 7?

Answer: \_\_\_\_\_

C. The sequence of figures is extended to the 50th figure. Explain a way to find the number of small triangles in the 50th figure that does not involve drawing it and counting the number of triangles.

Content Domain

Algebra

Main Topic

Patterns

Cognitive Domain

Reasoning

Key

See scoring guide

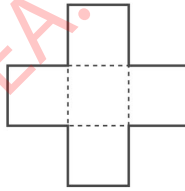
**C: Codes for Explanation for Extending to the 50th Figure**

**Note:** Code 20 takes priority over Code 21.

Code	Response	Item: M022261C
	<b>Correct Response</b>	
<b>20</b>	Correct general (i.e., literal) expression, e.g., $2n^2$ , or equivalent expressed in words	
<b>21</b>	$2 \times 50^2$ OR $2 \times 50 \times 50$ OR $100 \times 50$ OR $(50 + 50) \times 50$ OR equivalent expressed in words (disregard errors in computation)	
	<b>Partial Response</b>	
<b>10</b>	Derives answer (5000) without showing work	
<b>19</b>	Other partially correct	
	<b>Incorrect Response</b>	
<b>70</b>	$50 \times 2$ OR 100	
<b>71</b>	$50 \times 50$ OR 2,500	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

The figure consists of 5 squares of equal area. The area of the whole figure is  $245 \text{ cm}^2$ .



A. Find the area of one square.

Answer: \_\_\_\_\_  $\text{cm}^2$

B. Find the length of one side of one square.

Answer: \_\_\_\_\_ cm

C. Find the perimeter of the whole figure in centimeters.

Answer: \_\_\_\_\_ cm

M02227

Content Domain

Measurement

Main Topic

Tools, techniques, and formulas

Cognitive Domain

Solving Routine Problems

Key

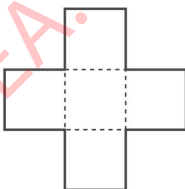
See scoring guide

**A: Codes for Area of One Square**

Code	Response	Item: M022227A
	<b>Correct Response</b>	
<b>10</b>	49	
	<b>Incorrect Response</b>	
<b>70</b>	1	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

The figure consists of 5 squares of equal area. The area of the whole figure is  $245 \text{ cm}^2$ .



A. Find the area of one square.

Answer: \_\_\_\_\_  $\text{cm}^2$

B. Find the length of one side of one square.

Answer: \_\_\_\_\_ cm

C. Find the perimeter of the whole figure in centimeters.

Answer: \_\_\_\_\_ cm

M02227B

Content Domain

Measurement

Main Topic

Tools, techniques, and formulas

Cognitive Domain

Solving Routine Problems

Key

See scoring guide

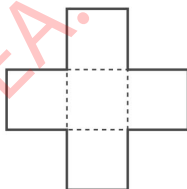
**B: Codes for Length of One Side**

Code	Response	Item: M022227B
	<b>Correct Response</b>	
10	7 (or $\sqrt{49}$ )	
11	Correct square root of incorrect answer to part a.	
	<b>Incorrect Response</b>	
70	1 – only if the answer to part A is not 1.	
71	Indication of division of area of one square (as obtained in part a) by 4 ( <i>e.g., 12.25, 49/4, etc.</i> )	
72	24.5 or other indication of division by 2	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	



## TIMSS 2003

The figure consists of 5 squares of equal area. The area of the whole figure is  $245 \text{ cm}^2$ .



A. Find the area of one square.

Answer: \_\_\_\_\_  $\text{cm}^2$

B. Find the length of one side of one square.

Answer: \_\_\_\_\_ cm

C. Find the perimeter of the whole figure in centimeters.

Answer: \_\_\_\_\_ cm

M02227

Content Domain

Measurement

Main Topic

Tools, techniques, and formulas

Cognitive Domain

Solving Routine Problems

Key

See scoring guide

**C: Codes for Perimeter of Figure**

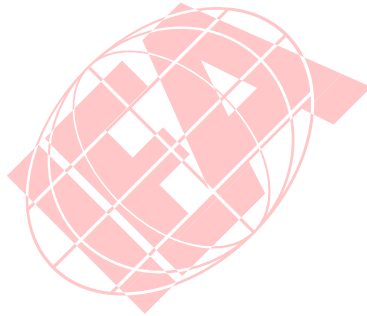
Code	Response	Item: M022227C
	<b>Correct Response</b>	
10	84	
11	12, on condition 1 was the response for part b	
12	Other responses consistent with answer to part b, using multiplication by 12 ( <i>e.g., 147, 294, etc.</i> )	
	<b>Incorrect Response</b>	
70	An answer that is 4 times the response to part b	
71	Indication of multiplication by 12 but multiplication is incorrect.	
72	245 [Confusion between area and perimeter]	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	

## TIMSS 2003

A car has a fuel tank that holds 45 L of fuel. The car consumes 8.5 L of fuel for each 100 km driven. A trip of 350 km was started with a full tank of fuel. How much remained in the tank at the end of the trip?

- (A) 15.25 L
- (B) 16.25 L
- (C) 24.75 L
- (D) 29.75 L

M022127



Content Domain

Number

Main Topic

Fractions and decimals

Cognitive Domain

Solving Routine Problems

Key

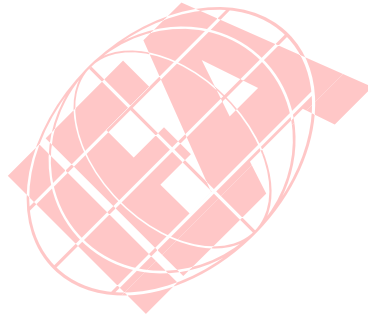
A

## TIMSS 2003

John and Cathy were told to divide a number by 100. By mistake John multiplied the number by 100 and obtained an answer of 450. Cathy correctly divided the number by 100. What was her answer?

- (A) 0.0045
- (B) 0.045
- (C) 0.45
- (D) 4.5

M032079



Content Domain

**Number**

Main Topic

**Fractions and decimals**

Cognitive Domain

**Solving Routine Problems**

Key

**B**

## TIMSS 2003

Content Domain

**Number**

Main Topic

**Whole numbers**

Cognitive Domain

**Solving Routine Problems**

Key

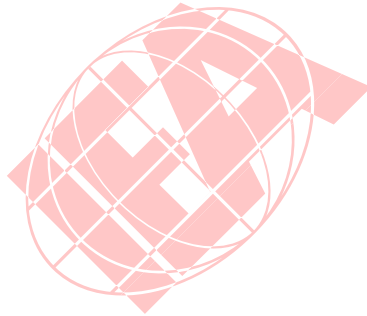
**See scoring guide**

The teachers at Parkway School plan to send 6 newsletters per year to each of the 620 families with children at the school. The newsletters each need 2 sheets of paper. The paper is sold in packs of 500 sheets.

What is the least number of packs of paper needed to print the school newsletter for the year?

Answer: \_\_\_\_\_

M032652



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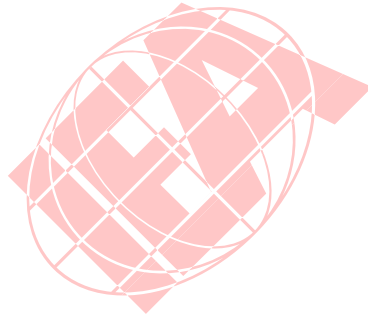
Code	Response	Item: M032652
	<b>Correct Response</b>	
<b>10</b>	15	
	<b>Incorrect Response</b>	
<b>70</b>	14 or 14.88	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

A shop increased its prices by 20%. What is the new price of an item which previously sold for 800 zeds?

- (A) 640 zeds
- (B) 900 zeds
- (C) 960 zeds
- (D) 1000 zeds

M032228



Content Domain

Number

Main Topic

Ratio, proportions, and percent

Cognitive Domain

Solving Routine Problems

Key

C

## TIMSS 2003

Carla paid  $x$  zeds for 3 cartons of juice. What is the price in zeds of 1 carton of juice?

- (A)  $\frac{x}{3}$
- (B)  $\frac{3}{x}$
- (C)  $3 + x$
- (D)  $3x$

M032044



Content Domain

Algebra

Main Topic

Algebraic expressions

Cognitive Domain

Using Concepts

Key

A



## TIMSS 2003

If  $y = 3x + 2$ , which of these expresses  $x$  in terms of  $y$ ?

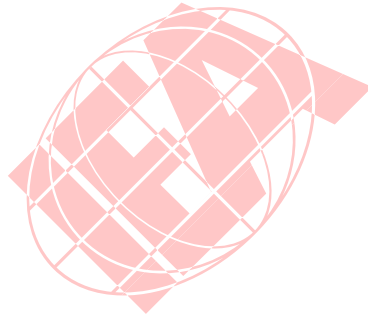
(A)  $x = \frac{y - 2}{3}$

(B)  $x = \frac{y + 2}{3}$

(C)  $x = \frac{y}{3} - 2$

(D)  $x = \frac{y}{3} + 2$

M032046



Content Domain

Algebra

Main Topic

Equations and formulas

Cognitive Domain

Using Concepts

Key

A

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## TIMSS 2003

Content Domain

Algebra

Main Topic

Equations and formulas

Cognitive Domain

Solving Routine Problems

Key

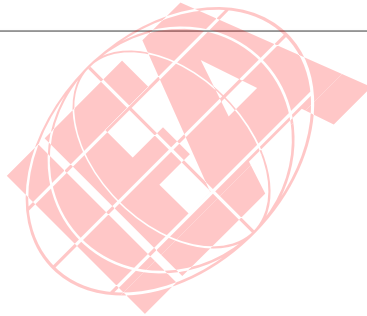
See scoring guide

At a market, 7 oranges and 4 lemons cost 43 zeds, and 11 oranges and 12 lemons cost 79 zeds. Using  $x$  to represent the cost of an orange and  $y$  to represent the cost of a lemon, write two equations that could be used to find the values of  $x$  and  $y$ .

Equation 1: \_\_\_\_\_

Equation 2: \_\_\_\_\_

M032545



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Code	Response	Item: M032545
	<b>Correct Response</b>	
<b>10</b>	$7x + 4y = 43$ (or equivalent) and $11x + 12y = 79$ (or equivalent)	
	<b>Incorrect Response</b>	
<b>70</b>	One equation correct and one incorrect/missing	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

In a car rally two checkpoints are 160 km apart. Drivers must travel from one checkpoint to the other in exactly 2.5 hours to earn maximum points.

A. What must the average speed be to travel the 160 km in this time?

Answer: \_\_\_\_\_

B. A driver took 1 hour to travel through a 40 km hilly section at the beginning of the course.

What must the average speed, in kilometers per hour, be for the remaining 120 km if the total time between checkpoints is to be 2.5 hours?

Answer: \_\_\_\_\_

M032649

Content Domain

**Measurement**

Main Topic

**Tools, techniques, and formulas**

Cognitive Domain

**Solving Routine Problems**

Key

**See scoring guide**

**A: Codes for Overall Average Speed**

<b>Code</b>	<b>Response</b>	<b>Item: M032649A</b>
	<b>Correct Response</b>	
<b>10</b>	64 kph or 64 or equivalent	
	<b>Incorrect Response</b>	
<b>79</b>	Incorrect (including crossed out/erased, stray marks, illegible or off task).	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

In a car rally two checkpoints are 160 km apart. Drivers must travel from one checkpoint to the other in exactly 2.5 hours to earn maximum points.

A. What must the average speed be to travel the 160 km in this time?

Answer: \_\_\_\_\_

B. A driver took 1 hour to travel through a 40 km hilly section at the beginning of the course.

What must the average speed, in kilometers per hour, be for the remaining 120 km if the total time between checkpoints is to be 2.5 hours?

Answer: \_\_\_\_\_

M032649

Content Domain

**Measurement**

Main Topic

**Tools, techniques, and formulas**

Cognitive Domain

**Reasoning**

Key

**See scoring guide**

**B: Codes for Average Speed for One Section**

Code	Response	Item: M032649B
	<b>Correct Response</b>	
<b>10</b>	80 kph or 80	
	<b>Incorrect Response</b>	
<b>70</b>	$\frac{120}{2.5}$ or 48 shown	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible or off task).	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

A machine uses 2.4 liters of gasoline for every 30 hours of operation.  
How many liters of gasoline will the machine use in 100 hours?

- (A) 7.2
- (B) 8.0
- (C) 8.4
- (D) 9.6

M032533



Content Domain

**Number**

Main Topic

**Ratio, proportions, and percent**

Cognitive Domain

**Solving Routine Problems**

Key

**B**



## TIMSS 2003

Content Domain

Measurement

Main Topic

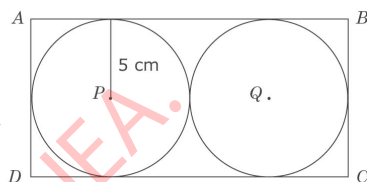
Tools, techniques, and formulas

Cognitive Domain

Using Concepts

Key

D



In the figure above,  $ABCD$  is a rectangle, and circles  $P$  and  $Q$  each have a radius of 5 cm. What is the area of the rectangle?

- (A)  $50 \text{ cm}^2$
- (B)  $60 \text{ cm}^2$
- (C)  $100 \text{ cm}^2$
- (D)  $200 \text{ cm}^2$

## TIMSS 2003

Content Domain

Geometry

Main Topic

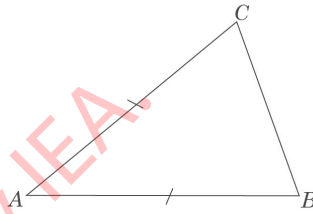
Congruence and similarity

Cognitive Domain

Knowing Facts and Procedures

Key

See scoring guide



The triangle  $ABC$  has  $AB = AC$ .

Draw a line to divide triangle  $ABC$  into two congruent triangles.



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Code	Response	Item: M032403
	<b>Correct Response</b>	
<b>10</b>	Line drawn from A to (approximate) midpoint of BC	
	<b>Incorrect Response</b>	
<b>70</b>	Line drawn from C or B	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible or off task).	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

**TIMSS 2003**

Content Domain

**Geometry**

Main Topic

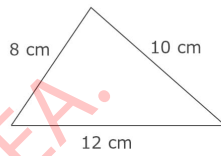
**Congruence and similarity**

Cognitive Domain

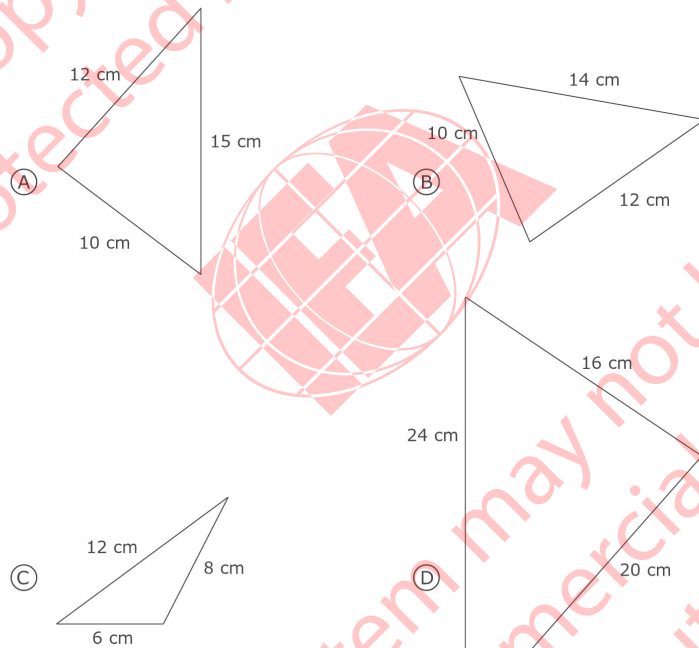
**Using Concepts**

Key

**D**



Which of the following triangles is similar to the triangle shown above?



M032261

**TIMSS 2003**

Content Domain

**Geometry**

Main Topic

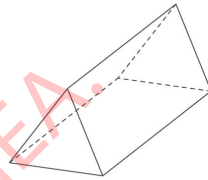
**Locations and spatial relationships**

Cognitive Domain

**Using Concepts**

Key

**D**



Which of these could be folded to make a shape like the 3-D figure above?

- (A)
- (B)
- (C)
- (D)

M032489

## TIMSS 2003

Content Domain

Geometry

Main Topic

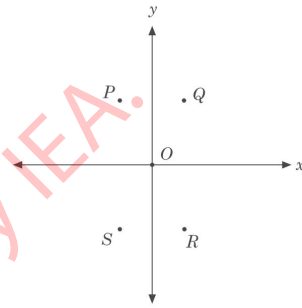
Locations and spatial relationships

Cognitive Domain

Knowing Facts and Procedures

Key

C



In the coordinate plane above, which point could have coordinates  $(2, -4)$ ?

- (A) P
- (B) Q
- (C) R
- (D) S

M032588

## TIMSS 2003

Content Domain

Data

Main Topic

Uncertainty and probability

Cognitive Domain

Reasoning

Key

C

In a school there were 1200 students (boys and girls). A sample of 100 students was selected at random, and 45 boys were found in the sample. Which of these is most likely to be the number of boys in the school?

- (A) 450
- (B) 500
- (C) 540
- (D) 600

M032271



**TIMSS 2003**

Content Domain

**Number**

Main Topic

**Whole numbers**

Cognitive Domain

**Solving Routine Problems**

Key

**See scoring guide**

A garden has 14 rows. Each row has 20 plants. The gardener then plants 6 more rows with 20 plants in each row.

How many plants are now there altogether?

Answer: \_\_\_\_\_

M032671





Code	Response	Item: M032671
	<b>Correct Response</b>	
<b>10</b>	400 or equivalent	
	<b>Incorrect Response</b>	
<b>79</b>	Incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

What is the value of  $1 - 5 \times (-2)$ ?

- (A) 11
- (B) 8
- (C) -8
- (D) -9

M032612

Content Domain

**Number**

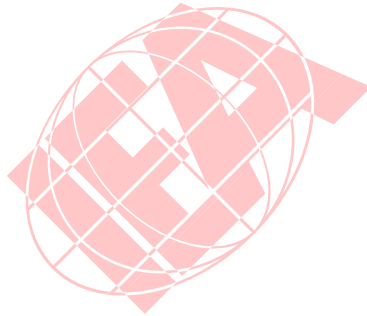
Main Topic

**Integers**

Cognitive Domain

**Knowing Facts and Procedures**

Key

**A**

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## TIMSS 2003

If  $a + 2b = 5$  and  $c = 3$ , what is the value of  $a + 2(b + c)$ ?

Answer: \_\_\_\_\_

M032557

Content Domain

Algebra

Main Topic

Algebraic expressions

Cognitive Domain

Reasoning

Key

See scoring guide



Code	Response	Item: M032557
	<b>Correct Response</b>	
<b>10</b>	11	
	<b>Incorrect Response</b>	
<b>70</b>	8	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible or off task.)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

Content Domain

Algebra

Main Topic

Equations and formulas

Cognitive Domain

Solving Routine Problems

Key

B

If  $x - y = 5$  and  $\frac{x}{2} = 3$ , what is the value of  $y$ ?

- (A) 6
- (B) 1
- (C) -1
- (D) -7

M032208



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## TIMSS 2003

Content Domain

Algebra

Main Topic

Equations and formulas

Cognitive Domain

Solving Routine Problems

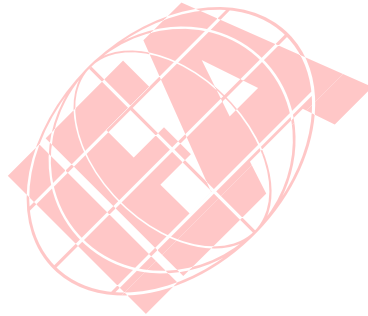
Key

A

If  $\frac{a}{b} = 70$ , then  $\frac{a}{2b} =$

- (A) 35
- (B) 68
- (C) 72
- (D) 140

M032210



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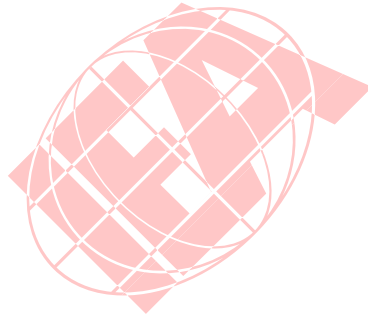
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## TIMSS 2003

Which of these units would usually be used for an area the size of a soccer field?

- (A) square centimeters
- (B) cubic centimeters
- (C) square meters
- (D) cubic meters

M032699



Content Domain

**Measurement**

Main Topic

**Attributes and units**

Cognitive Domain

**Knowing Facts and Procedures**

Key

**C**

**Phone Plans**

Instructions: The next three questions are about phone plans.

Betty, Frank, and Darlene have just moved to Zedland. They each need to get phone service. They received the following information from the telephone company about the two different phone plans it offers.

They must pay a set fee each month and there are different rates for each minute they talk. These rates depend on the time of the day or night they use the phone, and on which payment plan they choose. Both plans include time for which phone calls are free. Details of the two plans are shown in the table below.

Plan	Monthly Fee	Rate per minute		Free minutes per month
		Day (8 am – 6 pm)	Night (6 pm – 8 am)	
Plan A	20 zeds	3 zeds	1 zed	180
Plan B	15 zeds	2 zeds	2 zeds	120

MP32762

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## TIMSS 2003

Betty talks for less than 2 hours per month. Which plan would be less expensive for her?

Less expensive plan \_\_\_\_\_

Explain your answer in terms of both the monthly fee and free minutes.

Questions for Phone Plans continue. →

Content Domain

**Data**

Main Topic

**Data interpretation**

Cognitive Domain

**Reasoning**

Key

**See scoring guide**

Code	Response	Item: M032762
	<b>Correct Response</b>	
20	Plan B with explanation that includes free minutes used and explicit reference to lower monthly fee for Plan B	
	<b>Partial Response</b>	
10	Plan B with explicit reference to lower monthly fee and no reference to free minutes	
	<b>Incorrect Response</b>	
70	Plan B with inadequate (only free minutes) or no explanation	
71	Plan A with or without explanation	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	

## TIMSS 2003

Content Domain

Data

Main Topic

Data interpretation

Cognitive Domain

Solving Routine Problems

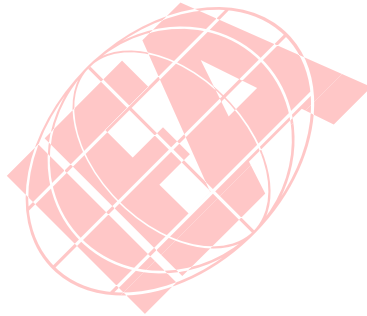
Key

See scoring guide

Frank talks for 5 hours per month at the night rate. What would each plan cost him per month? Show your work.

Cost Per Month for Plan A: \_\_\_\_\_ zeds

Cost Per Month for Plan B: \_\_\_\_\_ zeds



Questions for Phone Plans continue. →

Code	Response	Item: M032763
	<b>Correct Response</b>	
<b>20</b>	Plan A= 140 zeds and Plan B = 375 zeds, with work shown	
	<b>Partial Response</b>	
<b>10</b>	140 zeds and 375 zeds with no work shown	
<b>11</b>	Plan A or plan B correct with work shown but not both.	
	<b>Incorrect Response</b>	
<b>79</b>	Incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

## TIMSS 2003

Darlene signed up for the *Plan B*, and the cost of one month of service was 75 zeds. How many minutes did she talk that month? Show your work.

Minutes talked \_\_\_\_\_

M032764



End of Phone Plans section. ●

Content Domain

**Data**

Main Topic

**Data interpretation**

Cognitive Domain

**Solving Routine Problems**

Key

**See scoring guide**

Code	Response	Item: M032764
	<b>Correct Response</b>	
20	150 with work shown	
	<b>Partial Response</b>	
10	150 with no work shown	
11	Correct method but with calculation error	
12	30 with calculations leading to 30	
	<b>Incorrect Response</b>	
79	Incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	

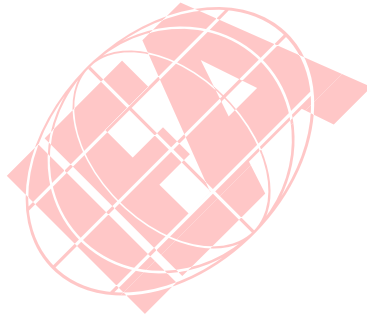
## TIMSS 2003

Oranges are packed in boxes. The average diameter of the oranges is 6 cm, and the boxes are 60 cm long, 36 cm wide, and 24 cm deep.

Which of these is the BEST approximation of the number of oranges that can be packed in a box?

- (A) 30
- (B) 240
- (C) 360
- (D) 1920

M032647



Content Domain

**Measurement**

Main Topic

**Tools, techniques, and formulas**

Cognitive Domain

**Reasoning**

Key

**B**

## TIMSS 2003

Content Domain

Geometry

Main Topic

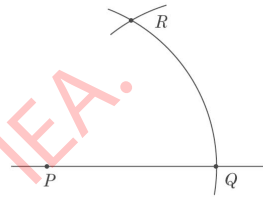
Two- and three-dimensional shapes

Cognitive Domain

Using Concepts

Key

C



In the figure above, an arc of a circle with center  $P$  has been drawn to cut the line at  $Q$ . Then an arc with the same radius and center  $Q$  was drawn to cut the first arc at  $R$ . What would be the size of angle  $PRQ$ ?

- (A)  $30^\circ$
- (B)  $45^\circ$
- (C)  $60^\circ$
- (D)  $75^\circ$

M032689

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## TIMSS 2003

Which of these is closest to  $11^2 + 9^2$ ?

- (A)  $20 + 20$
- (B)  $20 + 80$
- (C)  $120 + 20$
- (D)  $120 + 80$

M032609



Content Domain

Number

Main Topic

Whole numbers

Cognitive Domain

Knowing Facts and Procedures

Key

D

## TIMSS 2003

Which of these is equal to  $370 \times 998 + 370 \times 2$ ?

- (A)  $370 \times 1000$
- (B)  $372 \times 998$
- (C)  $740 \times 998$
- (D)  $370 \times 998 \times 2$

M032690

Content Domain

Number

Main Topic

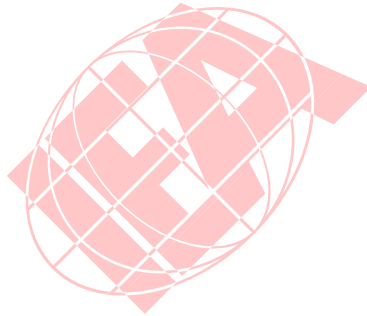
Whole numbers

Cognitive Domain

Knowing Facts and Procedures

Key

A



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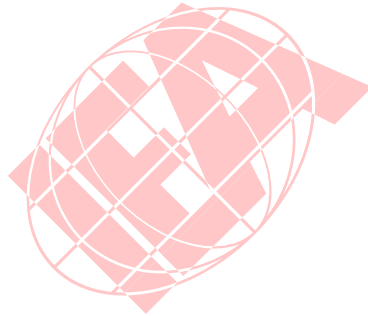
## TIMSS 2003

Three brothers, Bob, Dan, and Mark, receive a gift of 45 000 zeds from their father. The money is shared between the brothers in proportion to the number of children each one has. Bob has 2 children, Dan has 3 children, and Mark has 4 children.

How many zeds does Mark get?

- (A) 5 000
- (B) 10 000
- (C) 15 000
- (D) 20 000

M032727



Content Domain

Number

Main Topic

Ratio, proportions, and percent

Cognitive Domain

Solving Routine Problems

Key

D

**Geometry Tiling**

Instructions: The next three questions are about geometry tiling.

For this item, you have been given a piece of cardboard with 4 geometric tiles like the one shown below. Take the piece of cardboard and punch out the 4 tiles.

If you do not have the piece of cardboard raise your hand.



Questions for Geometry Tiling begin on the next page. →

MP32743

**TIMSS 2003**

Content Domain

**Geometry**

Main Topic

**Symmetry and transformations**

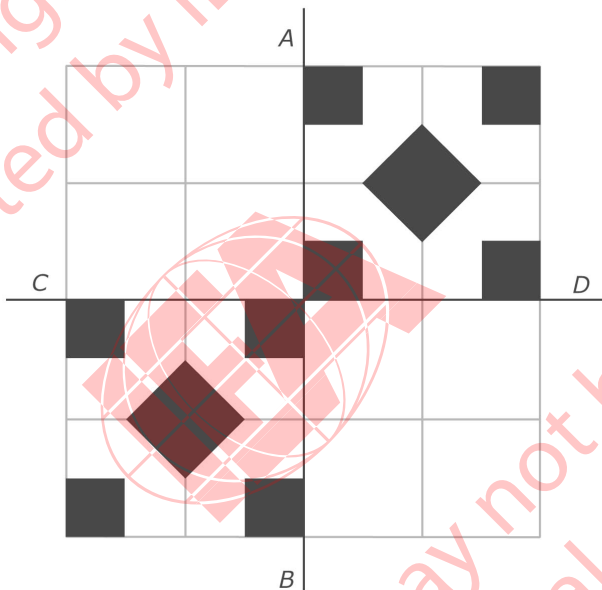
Cognitive Domain

**Using Concepts**

Key

**See scoring guide**

There are several ways of arranging the tiles so that they form patterns. The grid below has been shaded to show how tiles can be placed on some of the squares. The pattern can be continued so that  $AB$  and  $CD$  are lines of symmetry.



Shade in all the remaining squares on the grid so that the resulting pattern is symmetrical about line  $AB$ , and also is symmetrical about line  $CD$ .

Questions for Geometry Tiling continue. 

M032743

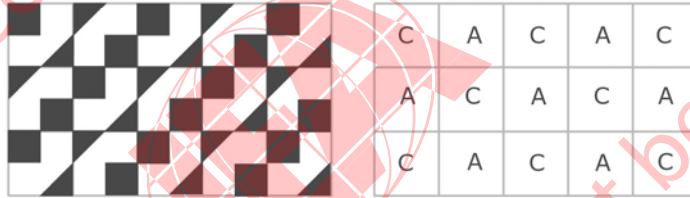
Code	Response	Item: M032743
	<b>Correct Response</b>	
<b>10</b>	Both quadrants correctly shaded (pattern shaded or demarcated in some way making symmetrical pattern about both axes, <i>AB</i> and <i>CD</i> )	
	<b>Incorrect Response</b>	
<b>70</b>	One of the two quadrants correctly shaded	
<b>79</b>	Incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

\*: Revised following data collection

The tiles can be placed on a grid in four different ways. The four ways are shown below with a letter, A, B, C, or D, to identify each one.



These letters can be used to describe tiling patterns. For example, the pattern below can be described by the grid of letters shown next to it.



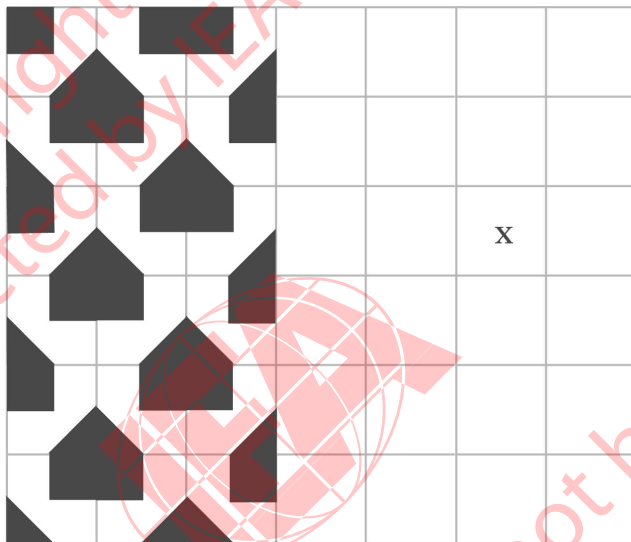
This Geometry Tiling question continues on the next page. 

MP32744

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**TIMSS 2003**

If the pattern on the grid below was continued, what letter would identify the orientation of the tile in the cell labeled X?



Answer: \_\_\_\_\_

Questions for Geometry Tiling continue. 

M032744

Content Domain

**Algebra**

Main Topic

**Patterns**

Cognitive Domain

**Using Concepts**

Key

**See scoring guide**



Code	Response	Item: M032744
	<b>Correct Response</b>	
<b>10</b>	D (including drawing of tile D)	
	<b>Incorrect Response</b>	
<b>70</b>	A, B, or C (including drawings)	
<b>79</b>	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
<b>99</b>	Blank	

TIMSS 2003

Content Domain

Geometry

Main Topic

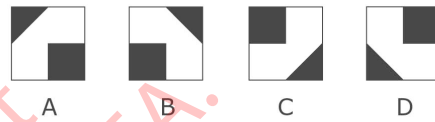
Symmetry and transformations

Cognitive Domain

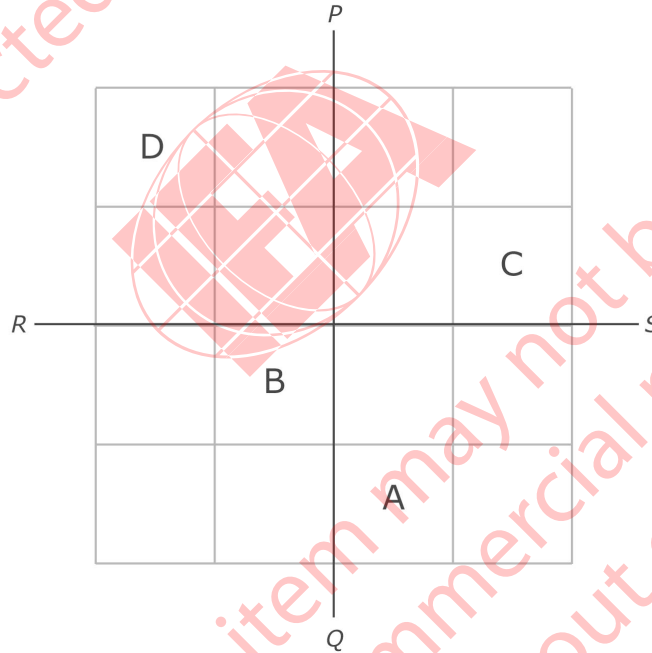
Reasoning

Key

See scoring guide



Continue to identify the tiles as shown above. On the grid below, write the letters A, B, C, or D to make a symmetrical pattern where  $PQ$  and  $RS$  would be lines of symmetry. Arrange the tiles to make a pattern.



M032745

End of Geometry Tiling section. ●

Code	Response	Item: M032745
	<b>Correct Response</b>	
20	All cells are correct with symmetrical geometric pattern about both axes, PQ and RS (letters or drawings)	
	<b>Partial Response</b>	
10	With respect to at least one of the original tiles the other three tiles are correct	
	<b>Incorrect Response</b>	
70	Letters placed symmetrically with respect to both PQ and RS	
79	Other incorrect (including crossed out/erased, stray marks, illegible, or off task)	
	<b>Nonresponse</b>	
99	Blank	

## TIMSS 2003

Content Domain

**Number**

Main Topic

**Ratio, proportions, and percent**

Cognitive Domain

**Reasoning**

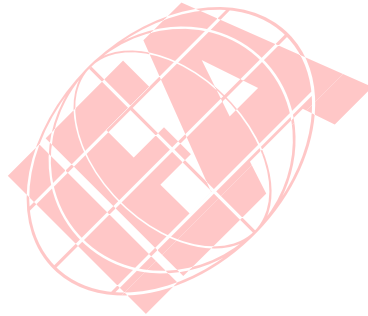
Key

**See scoring guide**

A computer club had 40 members, and 60% of the members were girls. Later, 10 boys joined the club. What percent of the members now are girls? Show the calculations that lead to your answer.

Answer: \_\_\_\_\_

M032233



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Code	Response	Item: M032233
	<b>Correct Response</b>	
20	48% with calculations shown	
	<b>Partial Response</b>	
10	24 girls	
11	Correct method but computational error	
12	48% with no calculations shown	
	<b>Incorrect Response</b>	
70	50%	
79	Other incorrect (including crossed out/erased, stray marks, illegible or off task)	
	<b>Nonresponse</b>	
99	Blank	

## TIMSS 2003

Which of these numbers is closest to 10?

- (A) 0.10
- (B) 9.99
- (C) 10.10
- (D) 10.90

M032670



Content Domain

**Number**

Main Topic

**Fractions and decimals**

Cognitive Domain

**Using Concepts**

Key

**B**

## TIMSS 2003

Content Domain

Number

Main Topic

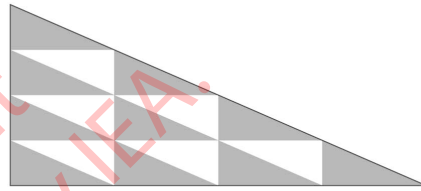
Ratio, proportions, and percent

Cognitive Domain

Knowing Facts and Procedures

Key

A



In the figure above, each of the smaller triangles has the same area. What is the ratio of the shaded area to the unshaded area?

- (A) 5:3
- (B) 8:5
- (C) 5:8
- (D) 3:5

M032447

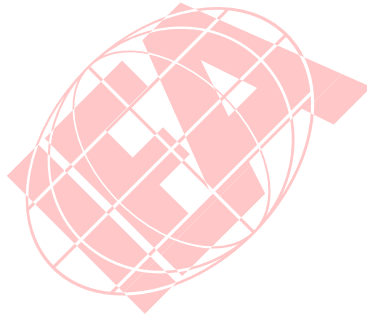
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## TIMSS 2003

Which of these is equal to  $2x - 3y + 7x + 5y$ ?

- (A)  $5x + 2y$
- (B)  $5x + 8y$
- (C)  $9x + 2y$
- (D)  $9x + 8y$

M032036



Content Domain

Algebra

Main Topic

Algebraic expressions

Cognitive Domain

Knowing Facts and Procedures

Key

C



## TIMSS 2003

Content Domain

Algebra

Main Topic

Equations and formulas

Cognitive Domain

Knowing Facts and  
Procedures

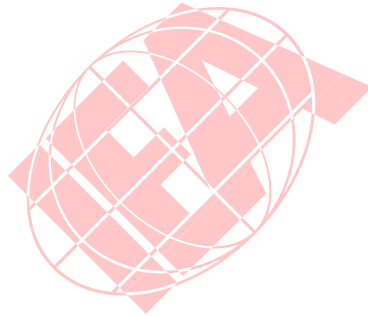
Key

A

If  $x + 3y = 11$  and  $2x + 3y = 13$ , then  $y =$

- (A) 3
- (B) 2
- (C) -2
- (D) -3

M032728



## TIMSS 2003

Content Domain

Measurement

Main Topic

Attributes and units

Cognitive Domain

Knowing Facts and Procedures

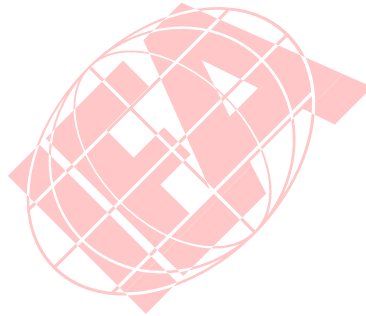
Key

C

Which of these could be the measure of the area of a triangle?

- (A) 2 cm
- (B) 3 m
- (C)  $5 \text{ cm}^2$
- (D)  $8 \text{ m}^3$

M032732



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