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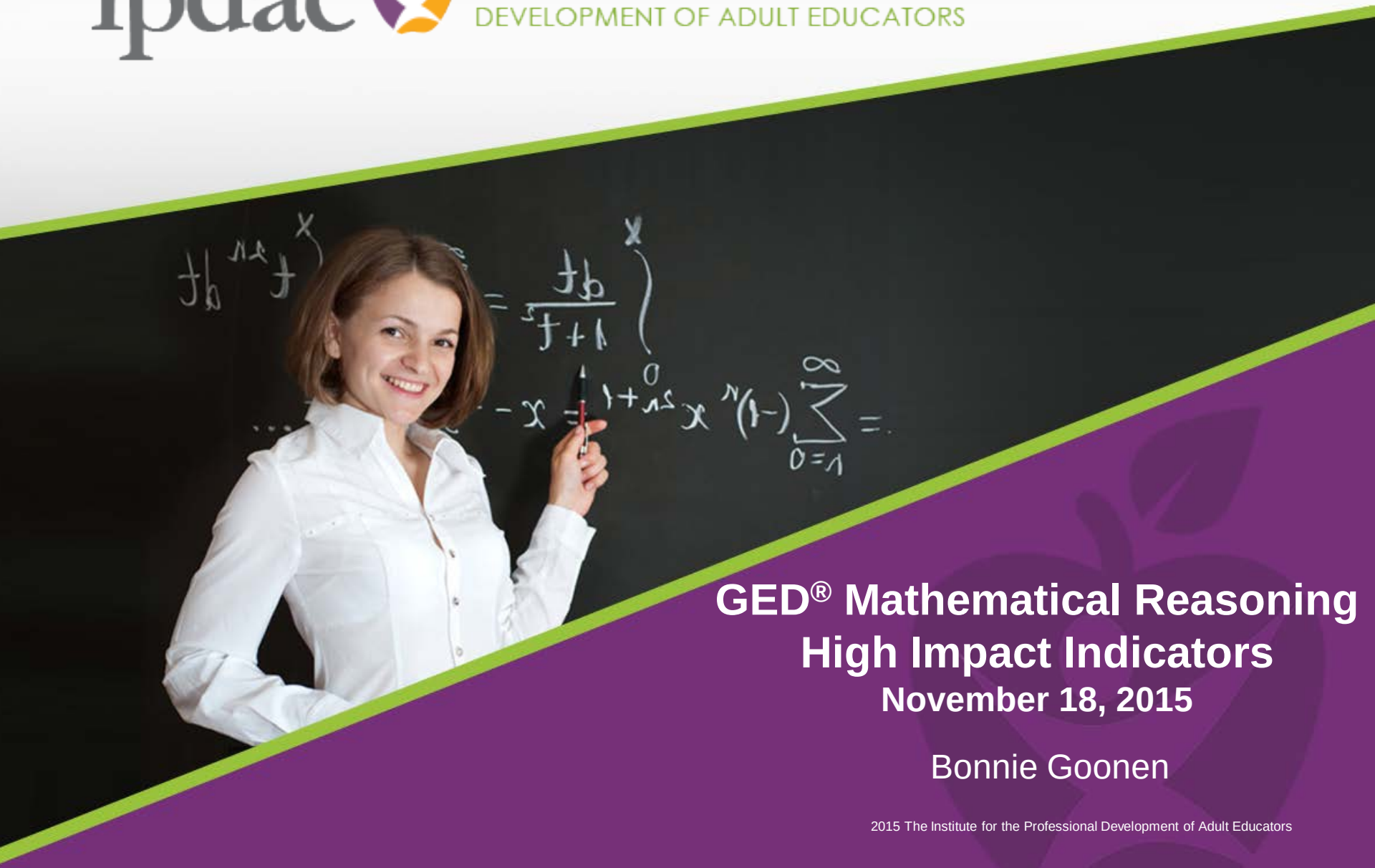

GED® Mathematical Reasoning High Impact Indicators

November 18, 2015

Bonnie Goonen

2015 The Institute for the Professional Development of Adult Educators

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BY EDUCATORS FOR EDUCATORS

Welcome!

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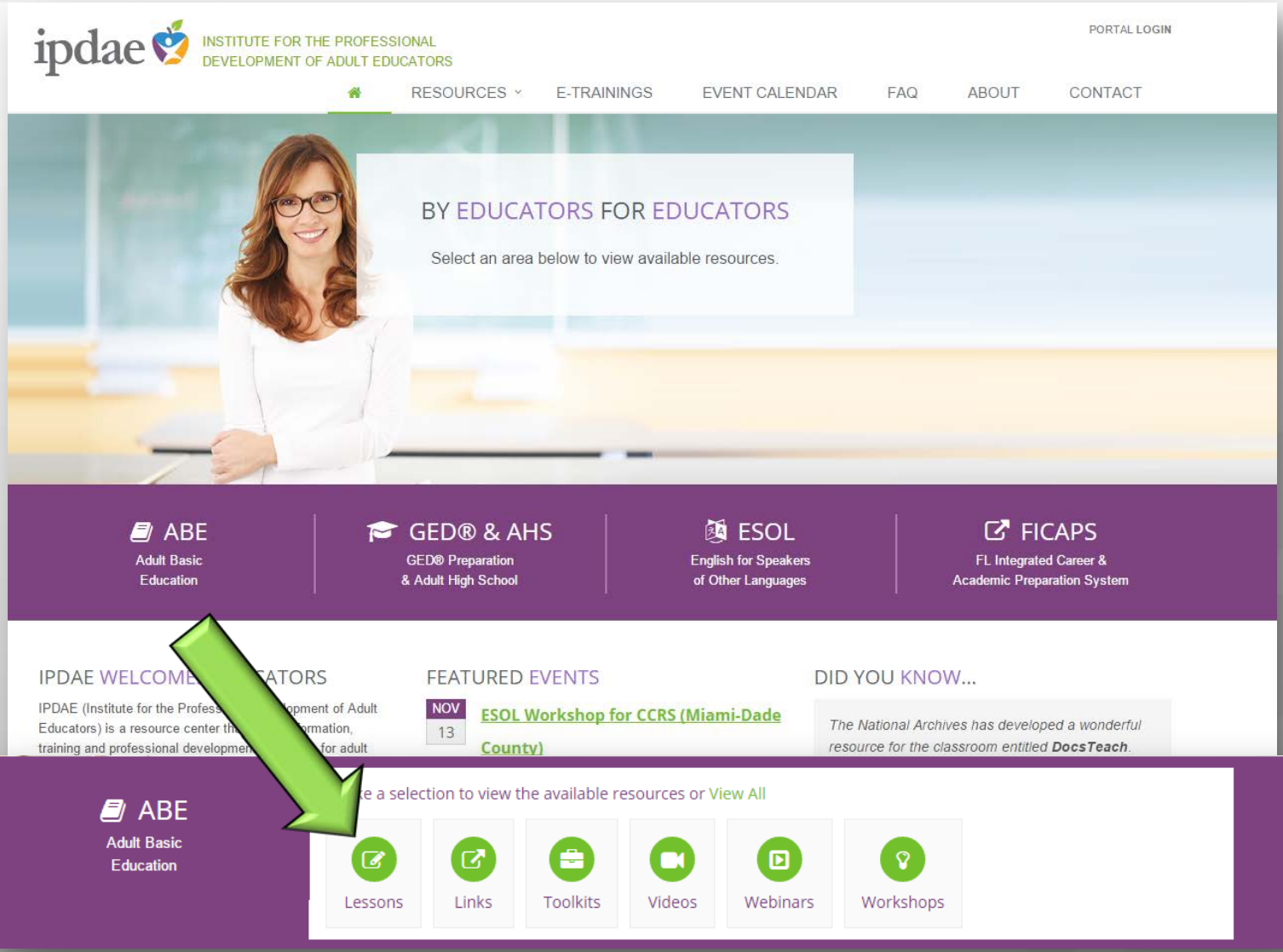
Announcing New ABE Lesson Plans



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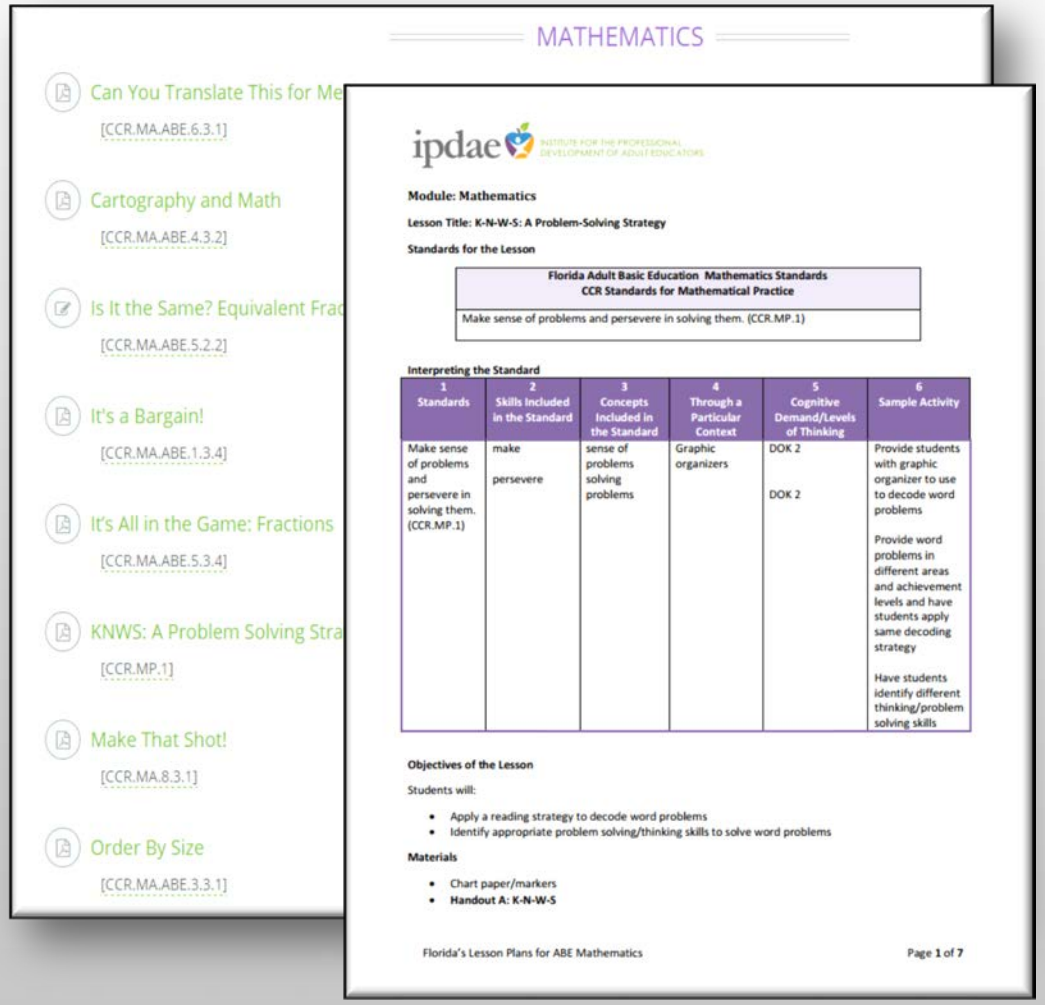
Announcing New ABE Lesson Plans



- 10 New Lesson Plans for ABE Math
- Aligned to the Florida Math Curriculum Frameworks (College and Career Readiness Standards)
- Complete with everything you need to teach the lesson
- More exciting resources to come . . .

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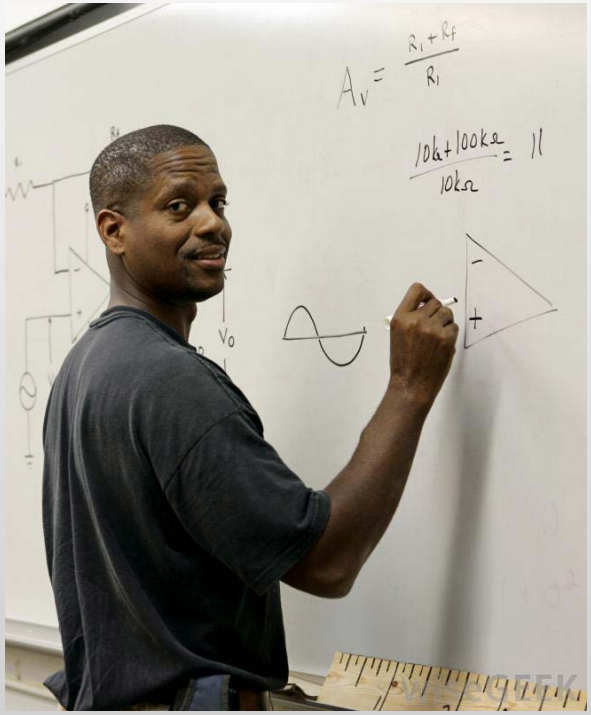
Objectives of Workshop



- Share High Impact Indicators and their importance in developing curriculum
- Discuss strategies to incorporate HIIs into lessons
- Share resources and ideas

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An Essential Tool for Developing Curriculum

HIGH IMPACT INDICATORS MATHEMATICAL REASONING

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What are HIIs?

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What makes indicators “High Impact”?

- Important skills that are widely applicable

- May currently receive coverage during GED® test preparation

- Lend themselves to straightforward instruction

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Targets → Indicators → Application

- **Assessment targets** describe the general concepts that are assessed on the GED® test
- **Indicators** are fine-grained descriptions of individual skills contained within an assessment target
- **Application** describes what to look for in student work

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How GEDTS identified these indicators

- Extensively analyzed test-taker performance on the operational GED® test
- Examined differences in performance between the 140 – 149 and 150 – 159 scaled scores in each content area
- Subjected the results to the filters indicated above

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Can your students?

Assessment Targets

Q.1 Apply number sense concepts, including ordering rational numbers, absolute value, multiples, factors, and exponents

Indicators

- **Q.1.a** Order fractions and decimals, including on a number line.
- **Q.1.b** Apply number properties involving multiples and factors, such as using the least common multiple, greatest common factor, or distributive property to rewrite numeric expressions.
- **Q.1.c** Apply rules of exponents in numerical expressions with rational exponents to write equivalent expressions with rational exponents.
- **Q.1.d** Identify absolute value of a rational number as its distance from 0 on the number line and determine the distance between two rational numbers on the number line, including using the absolute value of their difference.

Application

Students can:

- convert fractions to decimals or vice versa in order to compare them and can list the original numbers in ascending order.
- identify common factors and calculate the greatest common factor by multiplying common factors, and can also identify common multiples, including least common multiples.
- select the appropriate rule(s) of exponents to apply to exponential expressions, and simplify exponential expressions using one or more rules of exponents.
- identify the location of a rational number on the number line, create absolute value expressions to represent distances on the number line, and simplify absolute value expressions.

Guide – p. 3

Can your students?

The space shuttle *Discovery* traveled 148.2 million miles during its mission. The space shuttle *Atlantis* traveled 125.9 million miles. How many more miles did the space shuttle *Discovery* travel than the space shuttle *Atlantis*?

Ⓐ 22.3 miles

Ⓑ 274,100 miles

Ⓒ 22,300,000 miles

Ⓓ 274,100,000 miles

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Trees		
Description	**Diameter**	**Price**
Oak	$\frac{9}{16}$	**25.50**
Pecan	$\frac{5}{8}$	**15.75**
Ash	$\frac{3}{8}$	**32.99**
Mulberry	$\frac{1}{2}$	**12.60**

Which of the following shows the trees arranged in order from smallest to largest in size?

A. Pecan, Mulberry, Ash, Oak
B. Ash, Mulberry, Pecan, Oak
C. Mulberry, Ash, Oak, Pecan
D. Ash, Mulberry, Oak, Pecan

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Q.3 Calculate and use ratios, percents, and scale factors

- identify the relationship between quantities, then divide appropriately to determine the unit rate defined by those quantities.
- create proportions to model problems involving scale, then calculate measurements using proportional reasoning, and has also calculate measurements using scale factors.
- create proportions to model real-world problems involving ratios and proportions, and use ratios, proportions, and proportional reasoning to calculate quantities relating to those problems.
- identify the relationships between quantities (including amount of change) in problems involving percent increase and decrease, and has calculated quantities stemming from those problems, as well as the amount of percent increase of decrease.

Guide – p. 25

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Can your students?

Mathematical Reasoning - Candidate Name

Question 4 of 10

Answer Explanation | Calculator | Flag for Review

Formula Sheet | Calculator Reference

Dominic earns $285 per week plus an 8% commission rate on all his sales. If Dominic sells $4,213 worth of merchandise in one week, how much will his total earnings for the week be?

A. $337.04

B. $359.84

C. $513.00

D. $622.04

Previous | Next

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Can your students?

The graph shows the number of new- and used-car sales and leases in the United States from 2004 to 2010.

In which year did the car sales and leases have the *greatest* decrease compared with those of the previous year?

Ⓐ 2006

Ⓑ 2007

Ⓒ 2008

Ⓓ 2009

Can your students?

Mathematical Reasoning - Candidate Name

Question 16 of 16

Answer Explanation | Calculator | Flag for Review

Formula Sheet | Calculator Reference

Type your answer in the box. You may use numbers, a decimal point (.), and/or a negative sign (-) in your answer.

The probability of rain on each of the next three days is given in the table.

Probability of Rain on Each Day

Day	Tuesday	Wednesday	Thursday
Probability of Rain	30%	45%	50%

Based on the table, what is the percent probability that it will rain all three days?

[ ] %

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Q.4 Calculate dimensions, perimeter, circumference, and area of two-dimensional figures

Q.5 Calculate dimensions, surface area, and volume of three-dimensional figures

- identify the dimensions of a geometric figure from a diagram, then substitute the values for those dimensions into the appropriate formula for geometric measurement, then calculate the resulting numerical expression.
- calculate the perimeter of polygons.
- identify the shapes that comprise a composite figure.

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Mathematical Reasoning - Candidate Name

Question 10 of 16

Answer Explanation | Calculator | Flag for Review

A scientist is studying red maple tree growth in a state park. She measured the trunk diameters of a sample of trees in the same month every other year. The tables show the data for two of the trees.

Tree 1

Year	Trunk Diameter (inches)
1	18.6
3	19.2
5	19.8
7	20.4
9	21.0
11	21.6
13	22.2

Tree 2

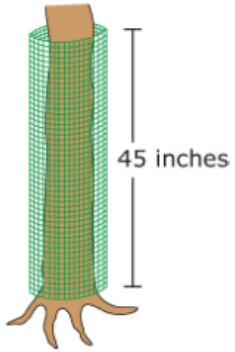
Year	Trunk Diameter (inches)
1	11.4
3	12.0
5	12.6
7	13.2
9	13.8
11	14.4
13	15.0

This is the final year in which she will collect data. When her data collection is complete, she will predict future red maple tree growth.

Formula Sheet | Calculator Reference

In year 13, the scientist will put tree wrap around tree 1 to protect it from the winter snow. The height of the tree wrap needs to be 45 inches.

Tree Wrap



The wrap is priced by the square foot. To the nearest square foot, how many square feet of wrap does she need?

- A. 22
- B. 44
- C. 121
- D. 261

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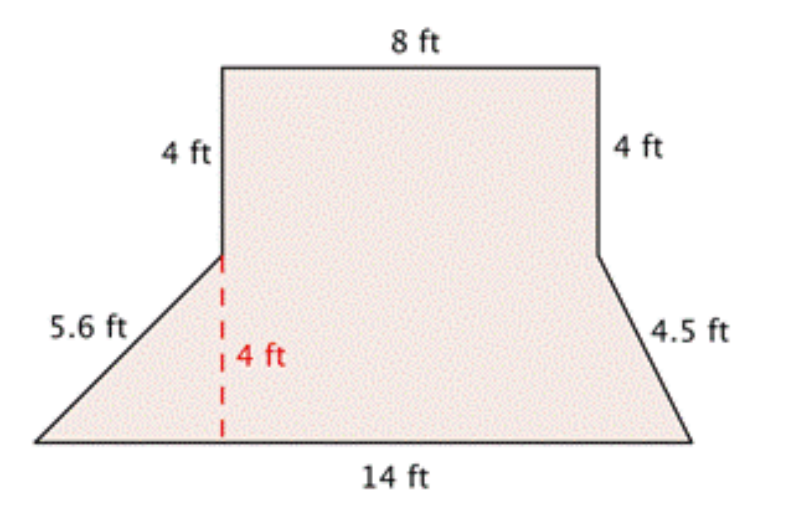
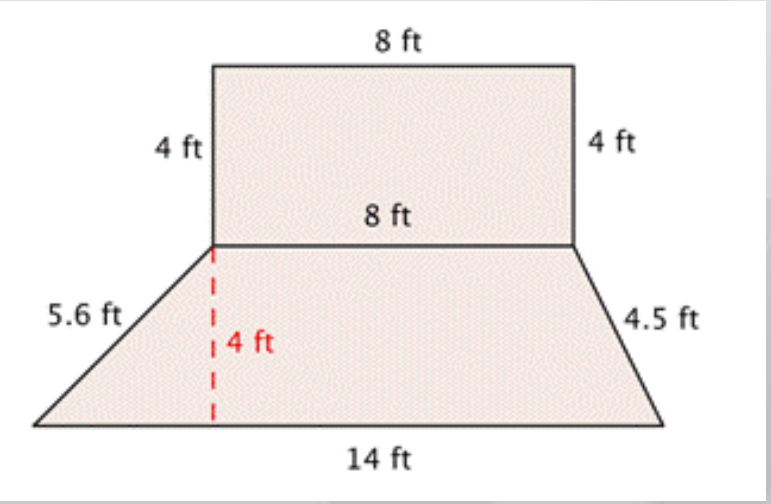
Can your students?

Rosie is planting a garden with the dimensions shown below. She wants to put a thin, even layer of mulch over the entire surface of the garden. The mulch costs $3.19 a square foot. How much money will she have to spend on mulch?





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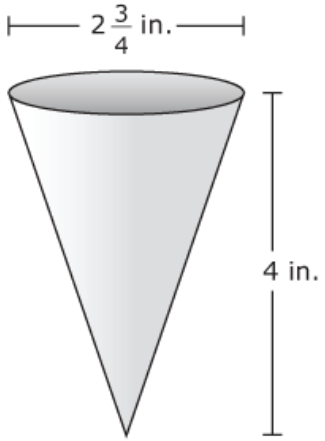
Mathematical Reasoning - Candidate Name

Question 12 of

Answer Explanation Calculator Flag for Revie

Formula Sheet Calculator Reference

An office uses paper drinking cups in the shape of a cone, with dimensions as shown.



To the nearest tenth of a cubic inch, what is the volume of each drinking cup?

- A. 2.5
- B. 7.9
- C. 23.7
- D. 31.7

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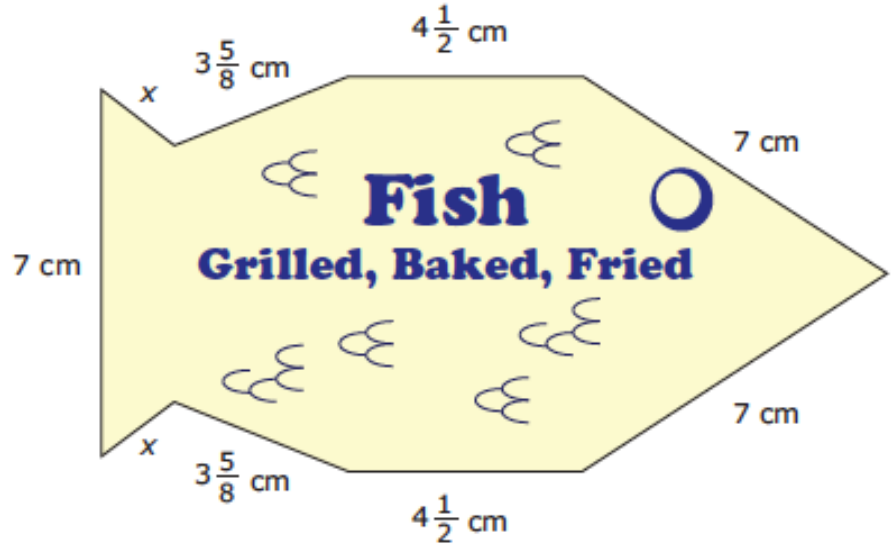
A painter uses the outline of a fish on a restaurant sign. The perimeter of the outline is $40\frac{3}{4}$ centimeters (cm).



What is the missing length, x cm, of the outline?

Ⓐ $\frac{7}{8}$

Ⓑ $1\frac{3}{4}$

Ⓒ $3\frac{1}{2}$

Ⓓ $5\frac{1}{4}$

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Can your students?

A.3 Write, manipulate, solve, and graph linear inequalities

- solve inequalities in one variable, using the standard algorithms.
- solve a one-variable inequality and identified or created a graph on the number line of the solution .
- analyze the relationship between quantities in a real-world problem, and then create an inequality to model the problem situation.
- analyze the relationship between quantities in a real-world problem, and then solve the problem through algebraic reasoning.

Guide – p. 27

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Mathematical Reasoning - Candidate Name

Question 3 of 10

Answer Explanation | Calculator | Flag for Review

Formula Sheet | Calculator Reference

Annie is planning a business meeting for her company. She has a budget of $1,325 for renting a meeting room at a local hotel and providing lunch. She expects 26 people to attend the meeting. The cost of renting the meeting room is $270. Which inequality shows how to find the amount, x, Annie can spend on lunch for each person?

A. $26x + 270 \geq 1{,}325$

B. $26x + 270 \leq 1{,}325$

C. $270x + 26 \geq 1{,}325$

D. $270x + 26 \leq 1{,}325$

Previous | Next

Mathematical Reasoning - Candidate Name

Question 13 of 16

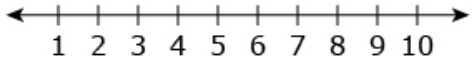
Answer Explanation Calculator Flag for Review

Formula Sheet Calculator Reference

Julia wants to spend $100 or less ordering shirts from an online company. The company charges a $5 shipping fee for any order. The inequality $5 + 15n \leq 100$ represents the number of shirts, n, Julia can order from the online company. Graph all possible numbers of shirts that Julia can buy.

Click on the number line to plot the point(s).

(NOTE: To remove a point, place the arrow over the point and click the left mouse button.)



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Mathematical Reasoning - Candidate Name

Question 2 of 10

Answer Explanation | Calculator | Flag for Review

Formula Sheet | Calculator Reference

What is the value of $36x - 8y^2$ when $x = 3$ and $y = -6$?

A. −288

B. −180

C. 1,200

D. 3,600

Review Screen | Previous | Next

Mathematical Reasoning - Candidate Name

Question 10 of 10

Answer Explanation | Calculator | Flag for Review

Formula Sheet | Calculator Reference

There are s steps from the pedestal to the head of the Statue of Liberty. The number of steps in the Washington Monument is 27 less than 6 times the number of steps in the Statue of Liberty. Which expression represents the number of steps in the Washington Monument in terms of s?

A. $27 < 6s$

B. $6(s - 27)$

C. $6s - 27$

D. $6s < 27$

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Mathematical Reasoning - Candidate Name

Question 6 of 10

Answer Explanation | Calculator | Flag for Review

A scientist is studying red maple tree growth in a state park. She measured the trunk diameters of a sample of trees in the same month every other year. The tables show the data for two of the trees.

Tree 1

Year	Trunk Diameter (inches)
1	18.6
3	19.2
5	19.8
7	20.4
9	21.0
11	21.6
13	22.2

Tree 2

Year	Trunk Diameter (inches)
1	11.4
3	12.0
5	12.6
7	13.2
9	13.8
11	14.4
13	15.0

This is the final year in which she will collect data. When her data collection is complete, she will predict future red maple tree growth.

Formula Sheet | Calculator Reference

The scientist creates an equation that models her data for each tree so that she can predict the diameter in the future. Complete a linear equation that fits the data for tree 1, where x is the year and y is the trunk diameter, in inches.

Click on the variables and numbers you want to select and drag them into the boxes.

Equation for Tree 1

$y =$ ☐ ☐ + ☐

-0.6	-0.3	0.3	0.6
18.0	18.3	18.6	x

Previous | Next

A.7 Compare, represent, and evaluate functions

- identify functions and non-functions displayed in graphs and tables, and create functions (graphs/tables).
- substitute values for variables in functions and evaluate the resulting numerical expressions.
- convert functional representations from one from to another, and compare properties of the functions.

Guide – p. 27

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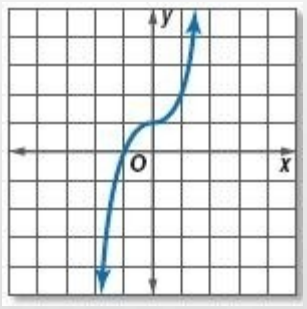
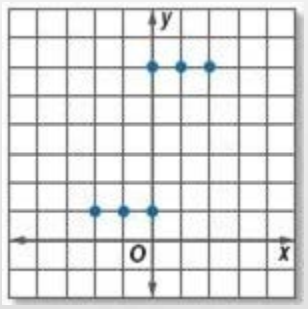
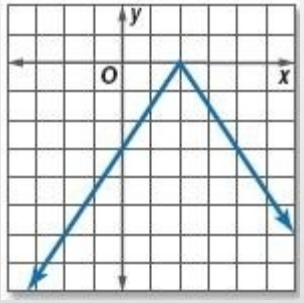
Determine which of the following are functions and why?



This is a function because no vertical line can be drawn so that it intersects the graph more than once.



A function is a relation in which each element of the domain is paired with exactly one element of the range. When x = 0, y = 1 and y = 6. So, this relation is not a function.



This is a function because no vertical line can be drawn so that it intersects the graph more than once.

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Can your students?

The speed limit on federal highways is 70 miles per hour (mph). The fine for speeding on is $10 per mile above the legal limit plus an additional $40. What would your speeding fine be if you were traveling 85 mph? Show all work or explain in words how you arrived at your answer.

M (miles exceeding)	10m + 40	F (fine)	(M,F)
5	10m + 40	90.00	(5, 90)
10	10m + 40	140.00	(10, 140)
15	10m + 40	190.00	(15, 190)
20	10m + 40	240.00	(20, 240)
25	10m + 40	290.00	(25, 290)
30	10m + 40	340.00	(30, 340)
35	10m + 40	390.00	(35, 390)
40	10m + 40	440.00	(40, 440)
45	10m + 40	490.00	(45, 490)
50	10m + 40	540.00	(50, 540)

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Guide – pp. 4 & 19-21

- Review the HII document

  http://www.gedtestingservice.com/uploads/files/38c313c646bfdb3afbbffb6330ddf209.pdf
- Determine which are covered well
- Determine gaps in the curriculum
- Identify ways to strengthen coverage

HII	Covered Well	Gaps in Coverage	How to Strengthen Coverage

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Let’s Take a Look at a Selected HII

QUANTITATIVE REASONING

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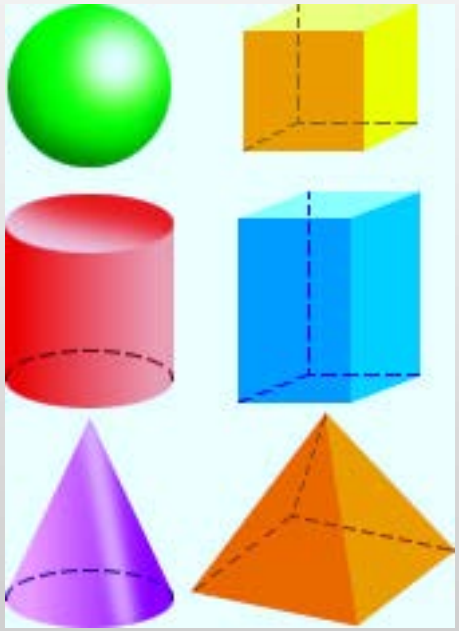

Calculate dimensions, surface area, and volume of three-dimensional figures (Q.5)

Two ways of calculating surface area

- Use the formula
- Find the area of each surface and add it up

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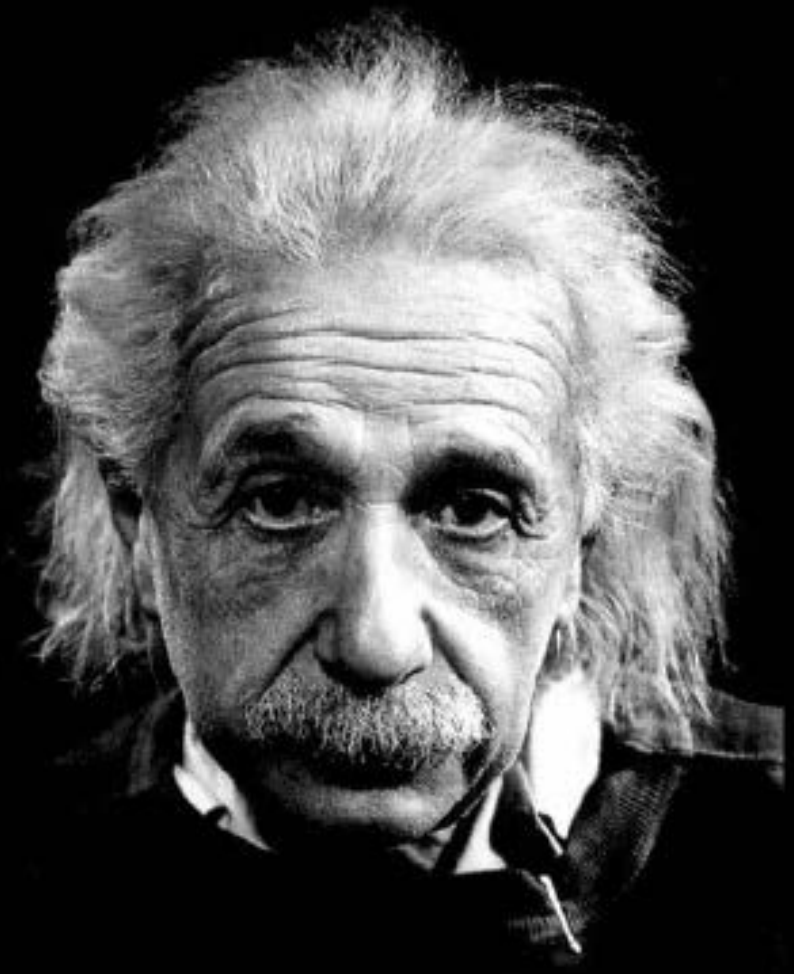
If you can't explain it simply, you don't understand it well enough

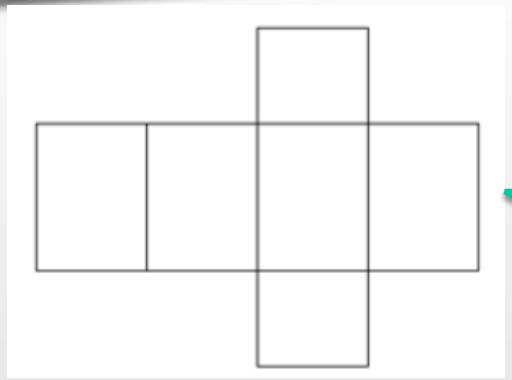


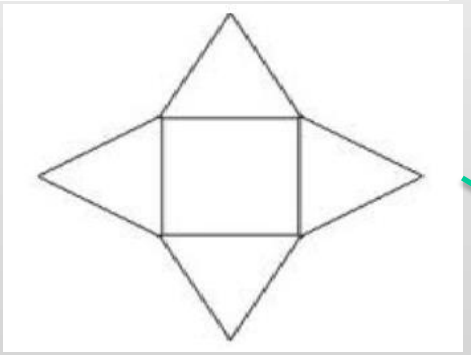
Use Nets to “Catch” Some Skills

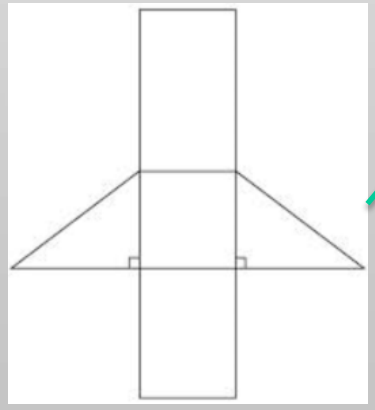
A **net** is the shape that is formed by unfolding a three-dimensional figure. In other words, a **net** is composed of all of the faces of the figure.

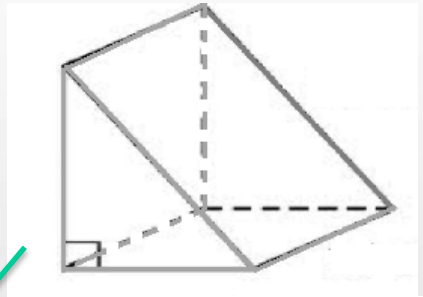
Guide – p. 5

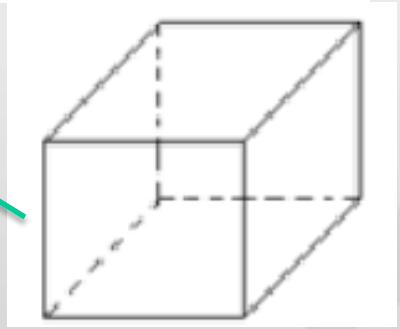
Using Nets

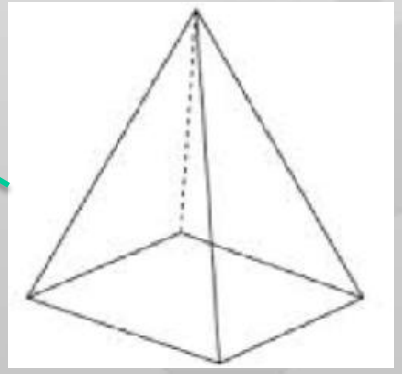












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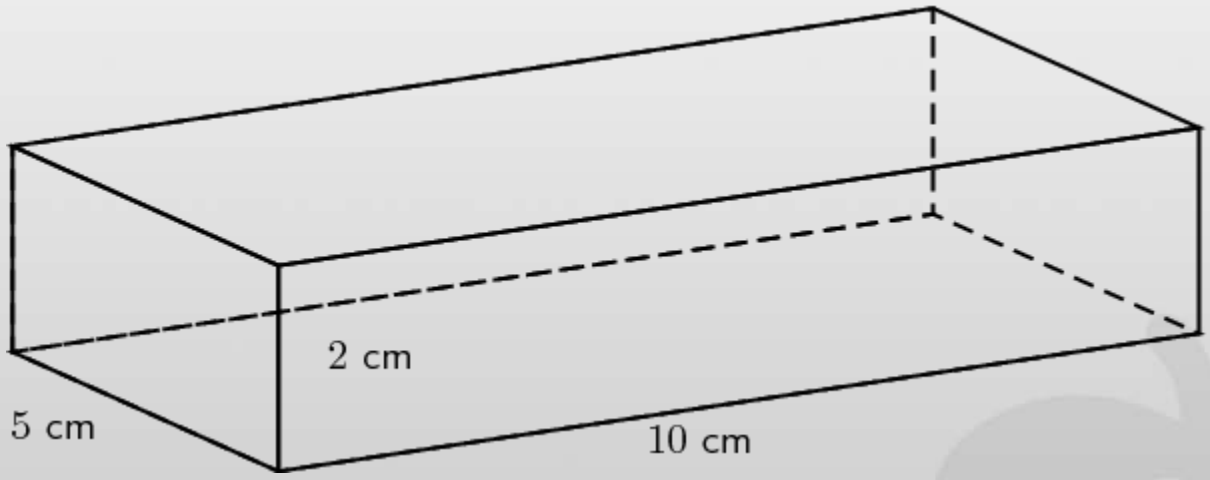
Using Nets to Find Surface Area

Find the surface area of the rectangular prism by using a net.



http://everythingmaths.co.za/maths/grade-10/12-measurement/12-measurement-02.cnxmlplus prism

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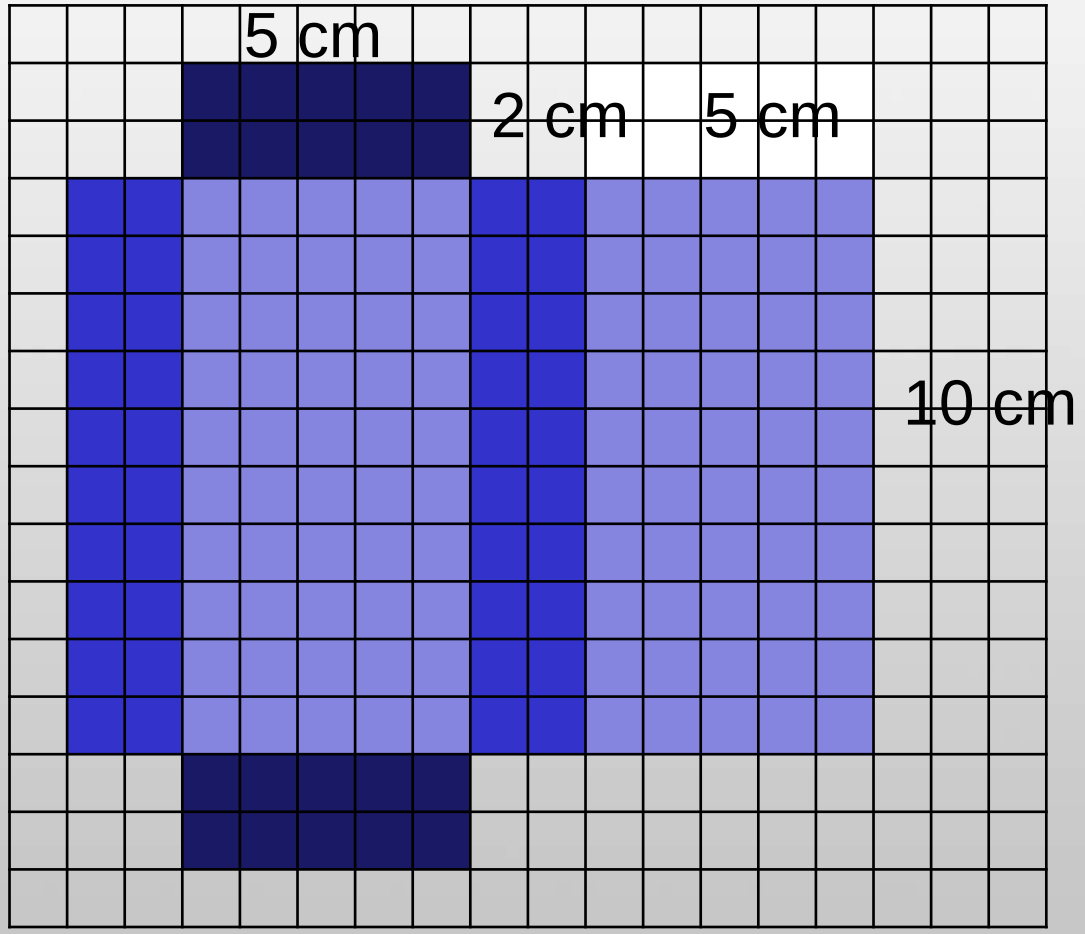
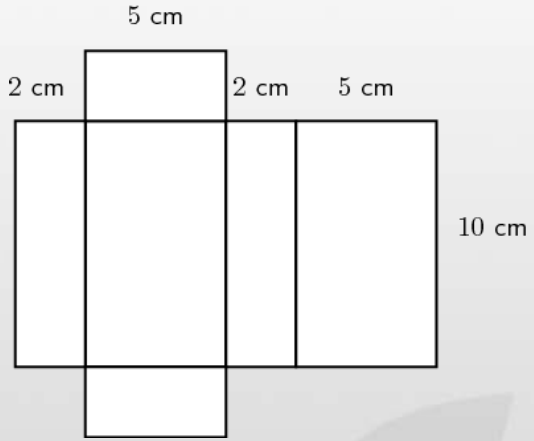
Using Nets to Find Surface Area





The surface area is 160 cm^2

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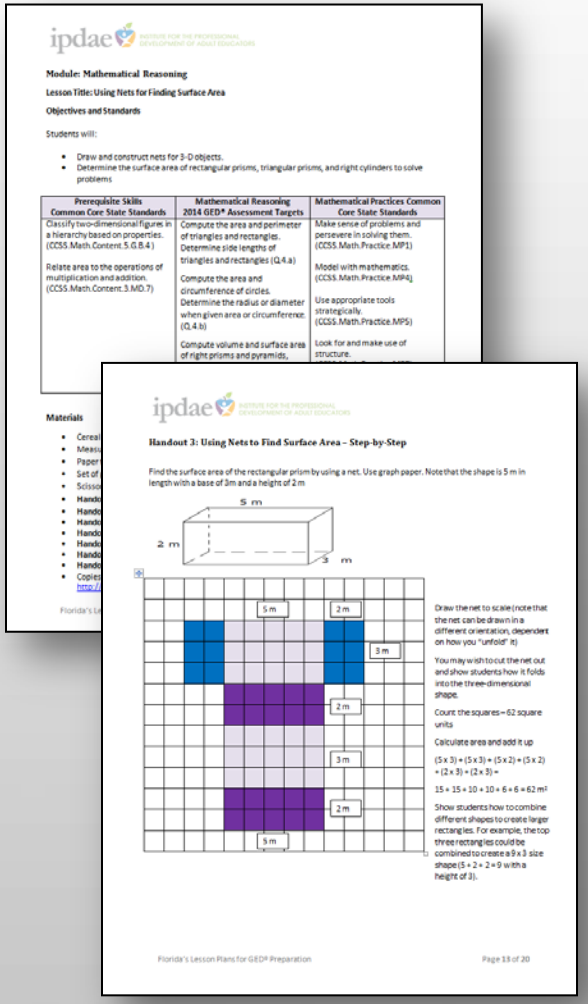
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Module: Mathematical Reasoning

Lesson Title: Using Nets for Finding Surface Area

Objectives and Standards

Students will:

- Draw and construct nets for 3-D objects.
- Determine the surface area of rectangular prisms, triangular prisms, and right cylinders to solve problems

Prerequisite Skills Common Core State Standards	Mathematical Reasoning 2014 GED® Assessment Targets	Mathematical Practices Common Core State Standards
Classify two-dimensional figures in a hierarchy based on properties. (CCSS.Math.Content.5.G.B.4) Relate area to the operations of multiplication and addition. (CCSS.Math.Content.3.MD.7)	Compute the area and perimeter of triangles and rectangles. Determine side lengths of triangles and rectangles (Q.4.a) Compute the area and circumference of circles. Determine the radius or diameter when given area or circumference. (Q.4.b) Compute volume and surface area of right prisms and pyramids,	Make sense of problems and persevere in solving them. (CCSS.Math.Practice.MP1) Model with mathematics. (CCSS.Math.Practice.MP4) Use appropriate tools strategically. (CCSS.Math.Practice.MP5) Look for and make use of structure.

Materials

Handout 3: Using Nets to Find Surface Area – Step-by-Step

Find the surface area of the rectangular prism by using a net. Use graph paper. Note that the shape is 5 m in length with a base of 3m and a height of 2 m

Draw the net to scale (note that the net can be drawn in a different orientation, dependent on how you "unfold" it)

You may wish to cut the net out and show students how it folds into the three-dimensional shape.

Count the squares – 62 square units

Calculate area and add it up

(5 x 3) + (5 x 3) + (5 x 2) + (5 x 2) + (2 x 3) + (2 x 3) =

15 + 15 + 10 + 10 + 6 + 6 = 62 m²

Show students how to combine different shapes to create larger rectangles. For example, the top three rectangles could be combined to create a 9 x 3 size shape (5 + 2 + 2 = 9 with a height of 3).

Florida's Lesson Plans for GED® Preparation

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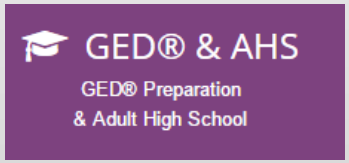
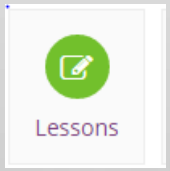
Interested in accessing this lesson and more GED® lesson plans?

- Go to http://floridaipdae.org/
- Click on 

- Click on 

- Have fun exploring

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Summing It Up

- Increase emphasis on High Impact Indicators
- Shift focus from “rules or processes” of mathematics to deeper understanding of “why”
- Incorporate instruction on problem-solving strategies and close-reading strategies
- Have high expectations of all students

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Questions
Comments

Access IPDAE Resources

www.floridaipdae.org

- Florida IPDAE E-Learning Center Courses
- Webinar Archive – all webinars are recorded
- Lesson Plans
- Grab and Gos
- Tips of the Week
- Workshops
- Much, much more . . .

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“The best professional development is ongoing, experiential, collaborative, and connected to and derived from working with students.”

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Always here to assist!

The IPDAE Team

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