From A to D: Assessment in the MYP

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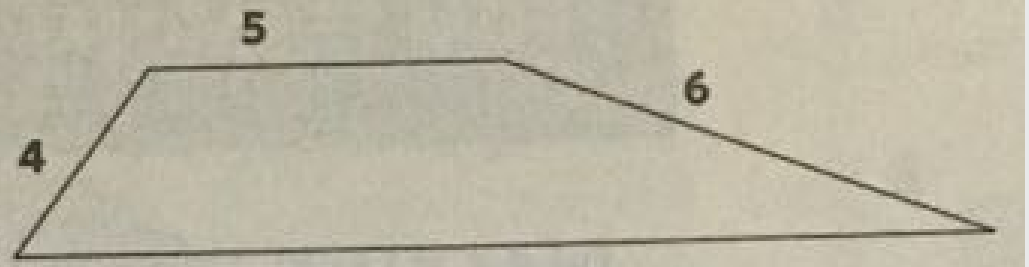
Find the perimeter of the figure (*note: figure not drawn to scale*):



(a) a whole number

(b) less than 30

(c) greater than 40

(d) 22

(e) 20

NOT an MYP assessment technique…

	A	B	C	D
Language and literature	Analyzing	Organizing	Producing text	Using language
Language acquisition	Comprehending spoken and visual text	Comprehending written and visual text	Communicating	Using language
Individuals and societies	Knowing and understanding	Investigating	Communicating	Thinking critically
Sciences	Knowing and understanding	Inquiring and designing	Processing and evaluating	Reflecting on the impacts of science
Mathematics	Knowing and understanding	Investigating patterns	Communicating	Applying mathematics in real world contexts
Arts	Knowing and understanding	Developing skills	Thinking creatively	Responding
Physical and health education	Knowing and understanding	Planning for performance	Applying and performing	Reflecting and improving performance
Design	Inquiring and analyzing	Developing ideas	Creating the solution	Evaluating

Question

How often do you need to use the criteria over the course of a unit? a semester? a year?

Mathematics	Knowing and understanding	Investigating patterns	Communicating	Applying mathematics in real world contexts

ANSWER

In the MYP, teachers must:

- ✓ make judgments on their students' achievement levels **at least twice** for each objective strand **in each subject group** criterion **each year**.
- ✓ ensure that this evidence comes from student performance **over the duration of the units taught**.

During the five years of the programme, all schools offering the MYP are required to communicate student achievement in each subject group to parents at regular intervals. Usually, this will be during and at the end of each school year, although it may vary considerably depending on local regulations and the school's organization of studies for each year of the MYP.

MYP reports of student achievement should communicate the student's achievement level for each assessment criterion. This practice provides students and their parents with information about the student's engagement with the objectives of each subject group and should be supported with advice for improvement, where applicable.

From Principles into Practice p. 91

Criteria	English	Science	Socials	Math
A	4	3	1	7
B	3	2	2	6
C	5	1	1	5
D	6	4	1	5

But how do you marry MYP grades and more traditional systems?

- Do you count MYP grades at all?
- Do you double grade assessments?
- Do you convert grades?

"Schools can determine MYP grades and then convert them to grades for other systems. It is not acceptable to determine grades for other systems and then convert these to MYP grades."

FPiP p. 92

Assessment in MYP Math

Teachers are expected to assess students in a variety of ways.

Consider the assessment criteria :

- **Criterion A: Knowing and understanding**
- **Criterion B: Investigating patterns**
- **Criterion C: Communicating**
- **Criterion D: Applying mathematics in real-life contexts**

Assessment in MYP Math

Teachers are expected to assess students in a variety of ways.

The assessment criteria are actually related to **tasks**:

- **Criterion A: Tests**
- **Criterion B: Investigations**
- **Criterion C: In combination with the others**
- **Criterion D: Real-life problems**

Criterion A

“Tests”

CRITERION A

1–2	The student is able to: i. **select** appropriate mathematics when solving simple problems in familiar situations ii. **apply** the selected mathematics successfully when solving these problems iii. generally **solve** these problems correctly.
3–4	The student is able to: i. **select** appropriate mathematics when solving more complex problems in familiar situations ii. **apply** the selected mathematics successfully when solving these problems iii. generally **solve** these problems correctly.
5–6	The student is able to: i. **select** appropriate mathematics when solving challenging problems in familiar situations ii. **apply** the selected mathematics successfully when solving these problems iii. generally **solve** these problems correctly.
7–8	The student is able to: i. **select** appropriate mathematics when solving challenging problems in both familiar and unfamiliar situations ii. **apply** the selected mathematics successfully when solving these problems iii. generally **solve** these problems correctly.

Criterion A— Knowing & understanding

Achievement level	Descriptor
7–8	The student is able to: i. select appropriate mathematics when solving challenging problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving these problems iii. generally solve these problems correctly.

Try it…

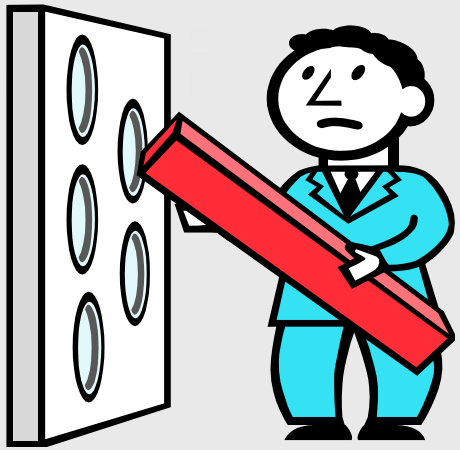
Look at the two tests and determine the level you think each student has earned.

Discuss your decision with the people at your table.

Is one test easier to assess? Why?

MYP: Best fit judgment

In certain cases, it may appear that the student has not fulfilled all of the descriptors in a lower band but has fulfilled some in a higher band. In those cases, teachers must use their professional judgment in determining the descriptor that **best fits** the student's performance.



CRITERION A

TESTS

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Criterion B

“Investigations”

How do kids learn best?

Peeling oranges…

Draw a circle with a radius equal to that of the orange.

Repeat 4 or 5 times.

Peel the orange in small pieces and fill the circles (you may not fill all of them).

What is this supposed to show?

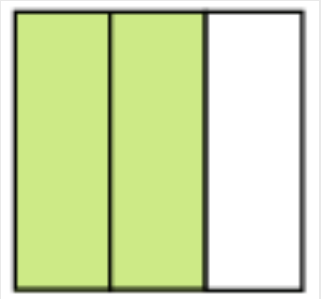
How many circles did you fill?

How many *should* you have filled? Explain.

A visual representation of

$\frac{2}{3} \times \frac{3}{4}$

Make a rectangle and divide it into three equal columns. Color two of them.



Now divide the rectangle in fourths in the other direction. Color three of them.

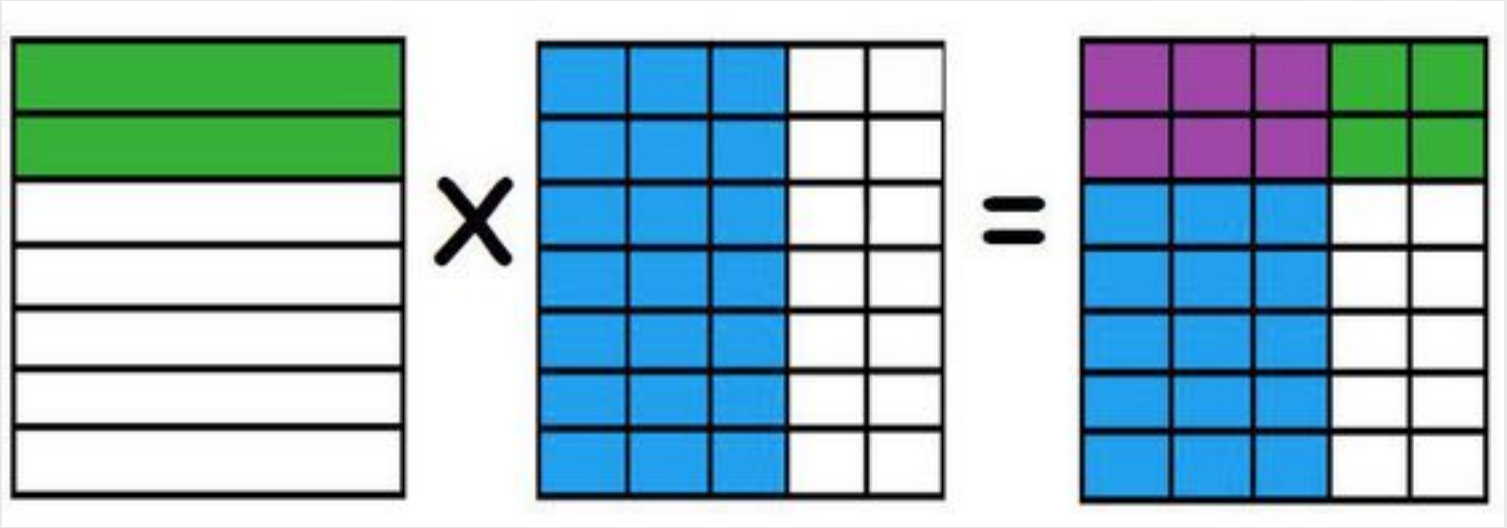
What fraction of the original whole is shaded?

$$\frac{6}{12}$$

A visual representation of

$$\frac{2}{7} \times \frac{3}{5}$$

Repeat the same procedure for the problem above.



$$\frac{2}{7} \times \frac{3}{5} = \frac{6}{35}$$

Try a few more…

$\frac{7}{9} \times \frac{1}{4}$

$\frac{4}{5} \times \frac{2}{8}$

$\frac{2}{8} \times \frac{2}{4}$

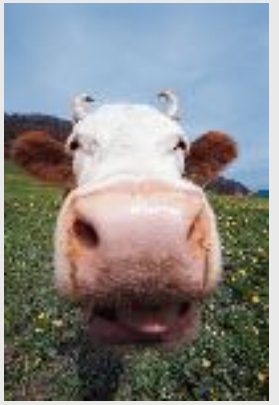
What pattern(s) do you notice?

How would you write/summarize what you found?

What do you do with $\frac{5}{2} \times \frac{3}{2}$?

More investigations …

Perform AT LEAST two of the investigations, answering all questions.

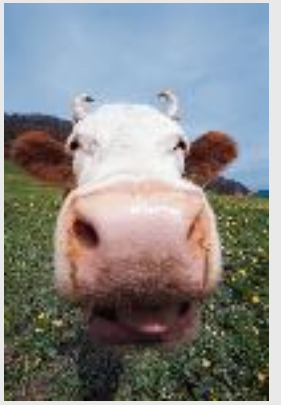


More investigations …

So…

What do you think?

How long should these take?



Why inquiry?

Not only does it allow students to understand the mathematics, but it gives them a way to get it back should they forget.

"If you deny students the opportunity to engage in this activity – to pose their own problems, make their own conjectures and discoveries, to be wrong, to be creatively frustrated, to have inspiration, and to cobble together their own explanations and proofs – you deny them mathematics itself."

Paul Lockhart

A Mathematician's Lament

Forms of inquiry

Structured	Guided	Open
Teachers provide questions for students to investigate	Teachers provide questions for students to investigate	Students formulate and investigate questions
Students investigate in a prescribed procedure	Students devise own problem solving procedures	Students devise own problem solving procedures

Requirements in MYP math/Elements of a unit

MYP requirements

- Perform investigations to discover patterns/teach using a variety of strategies

Unit planning

- Inquiry lessons, concepts, criterion B and/or C

Criterion B— Investigating patterns

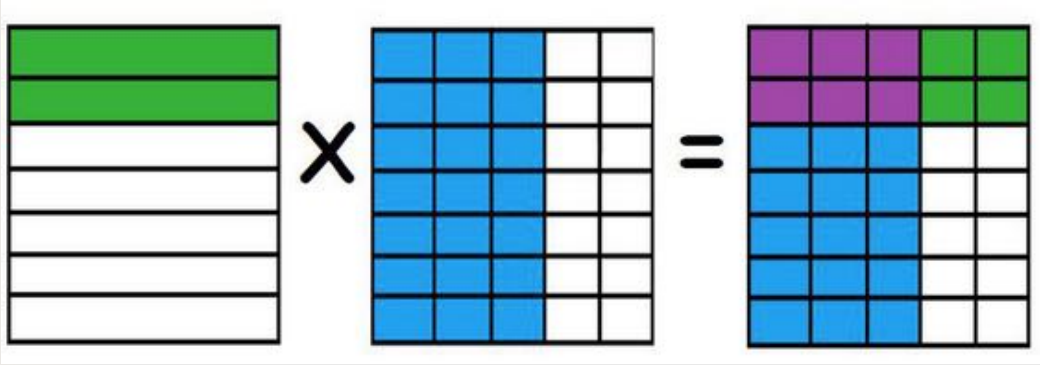
Achievement level	Descriptor
7–8	The student is able to: i. select and apply mathematical problem- solving techniques to discover complex patterns ii. describe patterns as relationships and/or general rules consistent with correct findings iii. verify and justify these relationships and/or general rules.

Criterion B

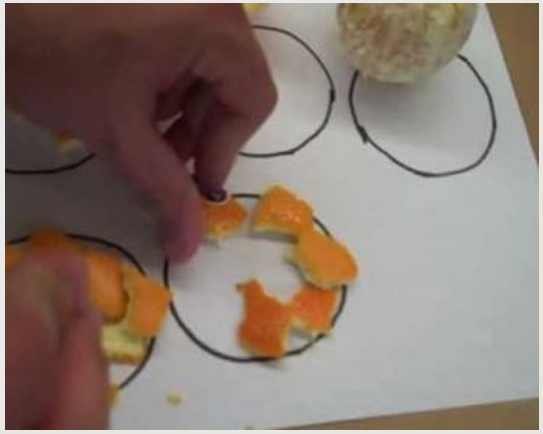
Take out the instructions for one of the inquiry activities you just did.

Read the descriptors for criterion B and determine whether or not students can reach the highest level. If not, what changes would you make in order to allow students to access the highest levels?

Can you assess criterion B with these?



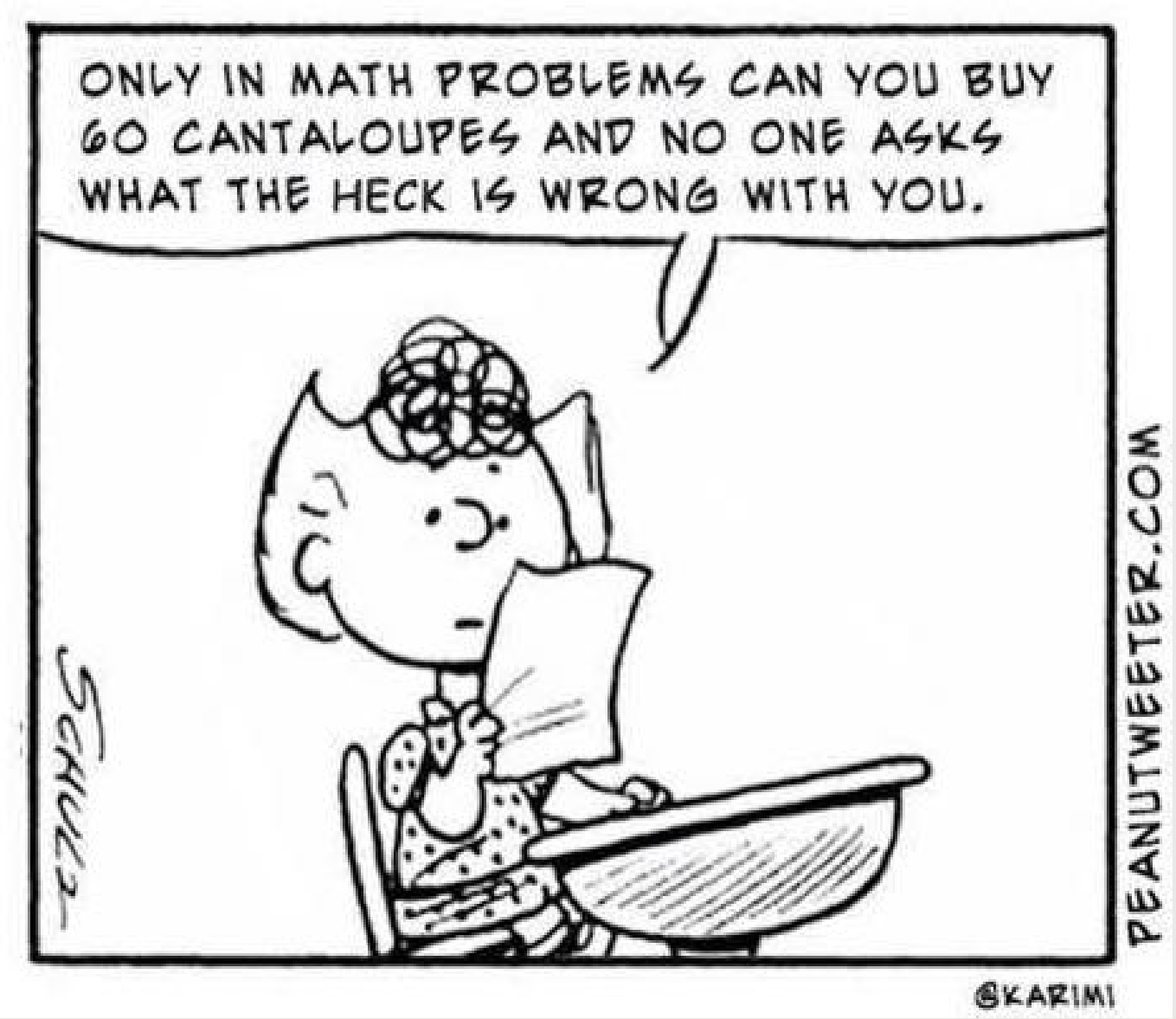
$$\frac{2}{7} \times \frac{3}{5} = \frac{6}{35}$$



Criterion D

"Real-life problems"

Why we need Criterion D…



Let's do some math!

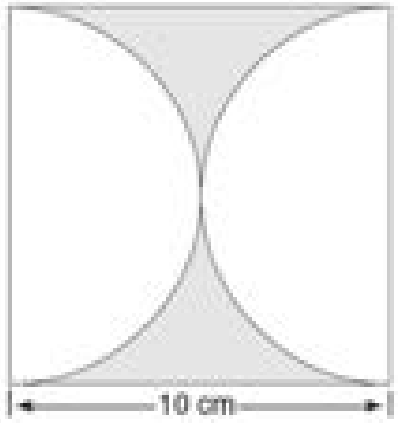
Inspired by…

NAME_____ DATE_____

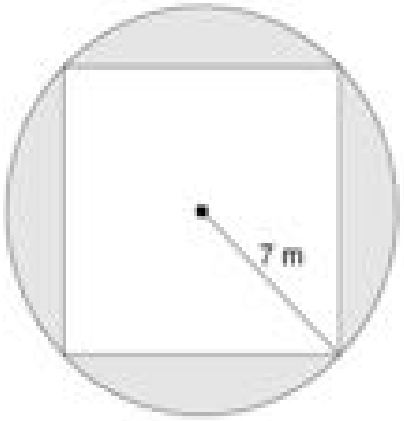
Area of Shaded Region Worksheet

Find the area of the shaded region in each of the following figures.

1.



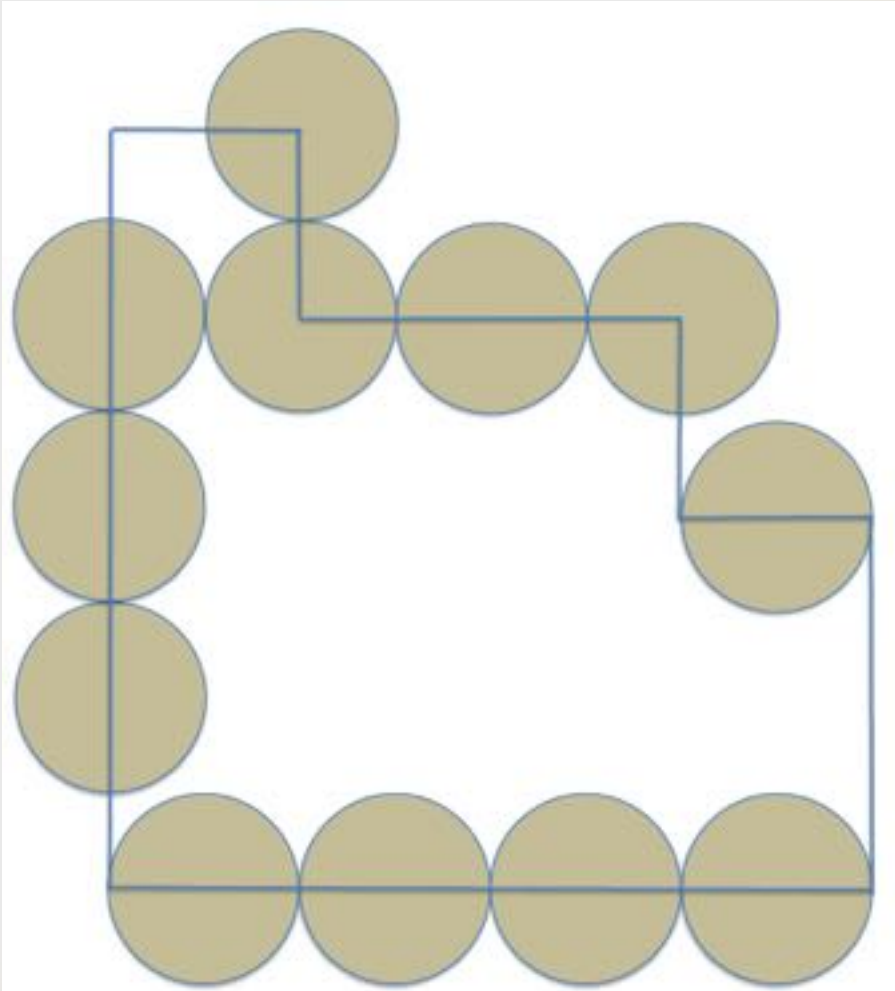
2.



…just taken one teensy step further.

What percentage of the octagon is shaded? (or not shade, I'll accept either one)

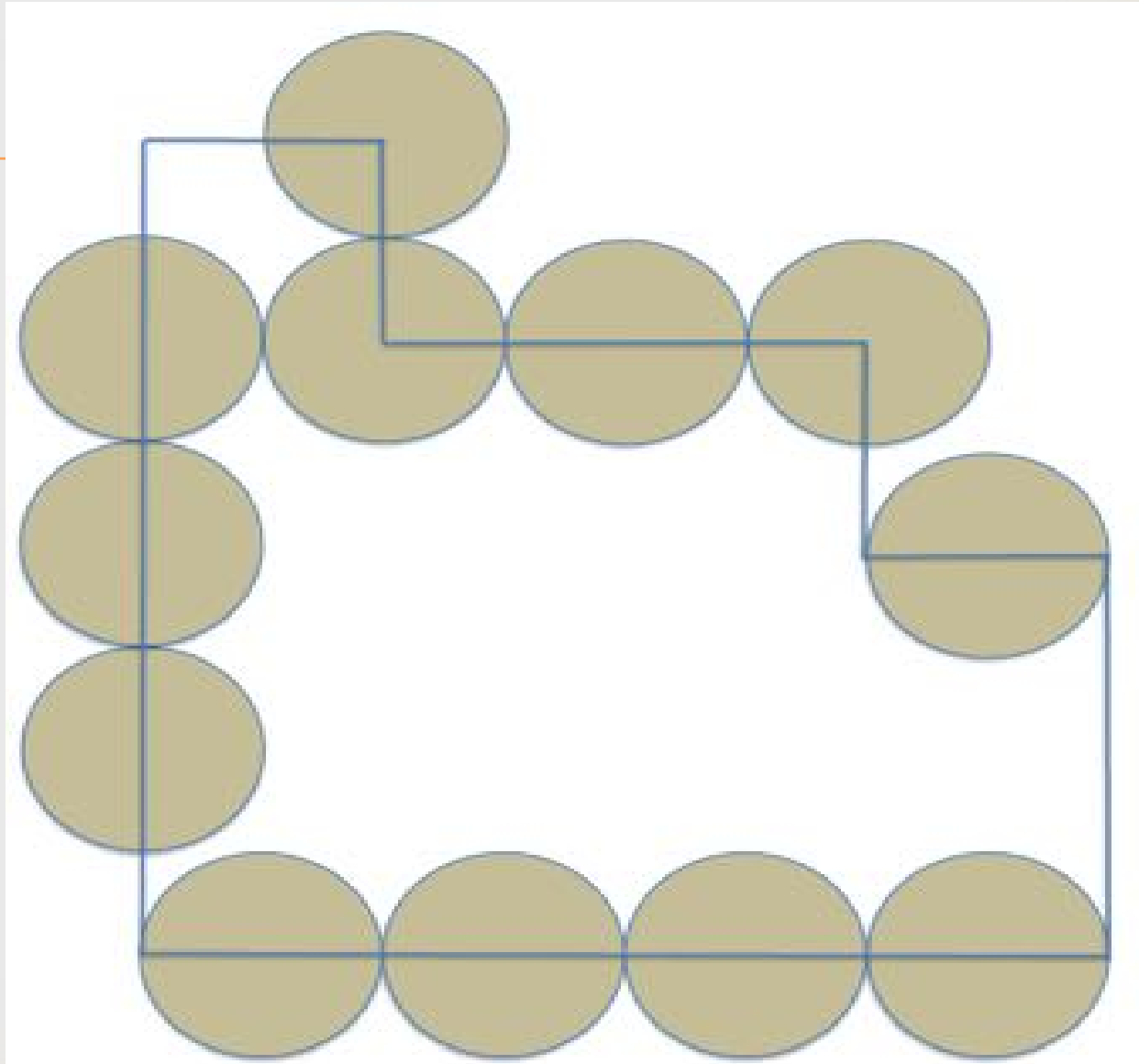
(r = 30ft)?



Because? it Matters... Why would anyone do this to children?!!

The city of Sacramento has an ordinance that states that any new parking lot must be at least 50% shaded within 15 years of its construction.

Does this parking lot meet that guideline?



Better yet…

The city has a "recommended tree" list from which you can select the trees to shade the parking lot. You have narrowed it down to the following trees, most of which are at least moderately fast-growing and also native to California.

TREE	DIAMETER (feet)	COST ($/tree)
Valley Oak	35	85
Southern Magnolia	30	77
California Bay	25	65
Cherry Plum	20	62

You may place the trees anywhere you like, but you must ensure that at least 50% of the parking lot is shaded while also trying to provide as much parking as possible to customers. Your total budget is $35,000. Draw up plans for where to place the trees, calculate your overall budget and justify that it meets the 50% shade requirement.

Please write a little…

- Can you please explain the degree of accuracy of your answer? (Interpret that any way that makes sense to you.)

- Also, explain whether or not you think your answer makes sense in the context of the problem.

Criterion D: Applying mathematics in real-life contexts

Achievement level	Descriptor
7–8	The student is able to: i. identify the relevant elements of the authentic real-life situation ii. select appropriate mathematical strategies to model the authentic real-life situation iii. apply the selected mathematical strategies to reach a correct solution iv. explain the degree of accuracy of the solution v. explain whether the solution makes sense in the context of the authentic real-life situation.

Finding good applications can be difficult…

Solve the system:

$$5x + 2y + 3z = 73$$

$$x + 2y + z = 23$$

$$x + 3y + 2z = 32$$

…but it is SO worth it!

Diet Assignment

Students use matrices to solve a 3x3 system of linear equations.

Systems of Equations Assignment

As you have seen in this unit, systems of equations can be a useful tool in planning for a healthy lifestyle.

In this assignment, you will select three foods that you eat almost every day and research how many grams of protein, fat and carbohydrates they provide to your daily diet per serving. See http://www.dietfacts.com/ for nutritional information on just about anything.

FOOD	PROTEIN (grams)	FAT (grams)	CARBOHYDRATES (grams)

The USDA recommends that a typical teenager consume 73 grams of carbohydrates, 23 grams of fat and 32 grams of protein at lunch. Using the nutritional information in your table and your knowledge of systems of equations, find the number of servings that would be required of each food to meet the USDA's recommendation.

Your work must be submitted either typed or handwritten and must include the following elements:

- a completed table
- a clear solution to the system using Cramer's Rule
- a clear solution to the system using row operations
- a clear answer of how many servings of each food that would allow you to meet the USDA's requirements

Requirements in MYP math/Elements of a unit

MYP requirements

- Perform investigations to discover patterns/teach using a variety of strategies
- Apply math to real-life situations

Unit planning

- Inquiry lessons, concepts, criterion B and/or C
- Global contexts, criterion D and/or C

Global Contexts

Identities and relationships

Scientific and technical innovation

Globalization and sustainability

Personal and cultural expression

Fairness and development

Orientation in time and space

The Global Contexts

Global context	Focus question(s) and description	Example explorations
Identities and relationships	Who am I? Who are we? Students will explore identity; beliefs and values; personal, physical, mental, social and spiritual health; human relationships including families, friends, communities and cultures; what it means to be human.	Possible explorations to develop • Competition and cooperation; teams, affiliation and leadership • Identity formation; self-esteem; status; roles and role models • Personal efficacy and agency; attitudes, motivation, independence; happiness and the good life • Physical, psychological and social development; transitions; health and well-being; lifestyle choices • Human nature and human dignity; moral reasoning and ethical judgment; consciousness and mind

Possible explorations

Global context	Focus question(s) and description	Example explorations
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Which global context does this explore? Justify your choice.

Diet Assignment

Which global context are students exploring in this unit?
Justify your choice.

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- a clear answer of how many servings of each food that would allow you to meet the USDA's requirements

What global context could a linear functions unit be exploring if this is one of the activities/tasks in it? CHOOSE ONE and JUSTIFY IT!

PREDICTING VOLCANIC ERUPTIONS

Linear Functions

The table below shows the major eruptions of Mount Vesuvius (you know, the one that destroyed Pompeii). Graph the data by hand and answer the questions that follow.

ERUPTION	YEAR
1	79
2	472
3	512
4	685
5	???
6	968
7	1037
8	1139
9	1500
10	1631
11	1660
12	1694
13	1698
14	1707
15	1737
16	1760
17	1767
18	1779
19	1794
20	1822
21	1834
22	1850
23	1855
24	1861
25	1868
26	1872
27	1906
28	1929

QUESTIONS:

Linear Functions and the Olympics
ASSIGNMENT

Using the data provided, draw a graph and answer the questions that follow.

NAME	YEAR	TIME
Tom Burke (USA)	1896	12.0
Frank Jarvis (USA)	1900	11.0
Archie Hahn (USA)	1904	11.0
Archie Hahn (USA)	1906	11.2
Reggie Walker (SAF)	1908	10.8
Ralph Craig (USA)	1912	10.8
Charles Paddock (USA)	1920	10.8
Harold Abrahams (GBR)	1924	10.6
Percy Williams (CAN)	1928	10.8
Eddie Tolan (USA)	1932	10.3
Jessie Owens (USA)	1936	10.3
Harrisn Dillard (USA)	1948	10.3
Lindy Remigino (USA)	1952	10.4
Bobby Morrow (USA)	1956	10.5
Armin Hary (GER)	1960	10.2
Bob Hayes (USA)	1964	10.0
Jim Hines (USA)	1968	9.95
Valery Borzov (URS)	1972	10.14
Hasely Crawford (TRI)	1976	10.06
Allan Wells (GBR)	1980	10.25
Carl Lewis (USA)	1984	9.99

In order to host track and field competitions, a 400-meter track needs to be created. A typical Olympic track looks like the following:

a Show that the runner who runs in the inside lane runs 400 m.

b All other runners in the 400 m race start a little further ahead since their lane is a little longer. If the radius of Lane 2 (the one beside the inside lane) is 37.92 m, find how much of a stagger (head start) the Lane 2 runner should be given. Round your answer to the nearest thousandth.

In recent years, it has become possible for people to try to trace their ethnic ancestry using something as simple as a saliva sample. The DNA in the saliva is analysed and the genetic ethnicity is predicted. The results can lead to new family connections or improve research so you can add more branches to the family tree.

A typical ancestry report might look like the following:

Country	Approximate amount
Algeria	1/20
Morocco	1/100
Benin	1/25
Cameroon	7/100
Native American	7/50
Portugal	1/4
Italy	6/25
England	1/5

What could you do with this? How could this become an assessment task?

Why we need more than procedural fluency

$$1\frac{1}{2} - 1\frac{1}{4}$$

How do we know if we have created an authentic task?

- ✓ **It explores a GLOBAL CONTEXT**
- ✓ **It can be assessed with CRITERION D**
- ✓ **GRASPS**

GRASPS

A suggested structure to develop depth and complexity for an assessment task

G = Goal *"Your task is…"*

R = Role *" You are a…"*

A = Audience *"Your audience is…"*

S = Situation *"The challenge involves dealing with…"*

P = Product, Performance and **Purpose**
"You will create a _____ *in order to* _____*."*

S = Standards and Criteria for Success
"Your performance needs to…"

Where do ideas come from?

Books/resources

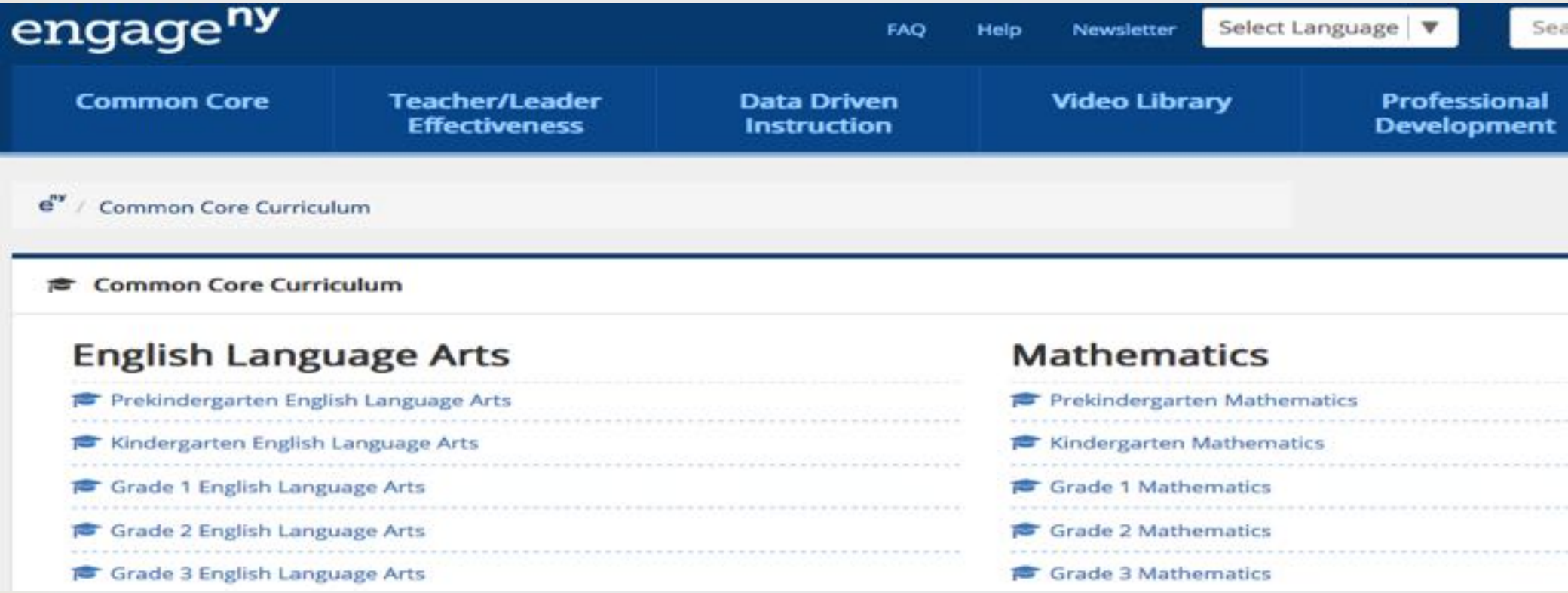
Tests/assessments

Other people's mail (ssshhhh…)

Reading/TV

Interests/events

A few resources…



Criterion C

Communicating

Criterion C— Communicating

Achievement level	Descriptor
7 - 8	The student is able to: i consistently use appropriate mathematical language ii. use different forms of mathematical representation to consistently present information correctly iii. move effectively between different forms of mathematical representation iv. communicate through lines of reasoning that are complete and coherent v. present work that is consistently organized using a logical structure.

Criterion C

Look at the tasks (criteria A, B and D) that you have seen today.

Which ones could be assessed with criterion C? Explain how you know.

“I’ll take Potpourri for $400, Alex.”

Mt. Vesuvius

Which criteria could you use to assess the Mt. Vesuvius task?

Justify your choice(s).

PREDICTING VOLCANIC ERUPTIONS

Linear Functions

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19	1794
20	1822
21	1834
22	1850
23	1855
24	1861
25	1868
26	1872
27	1906
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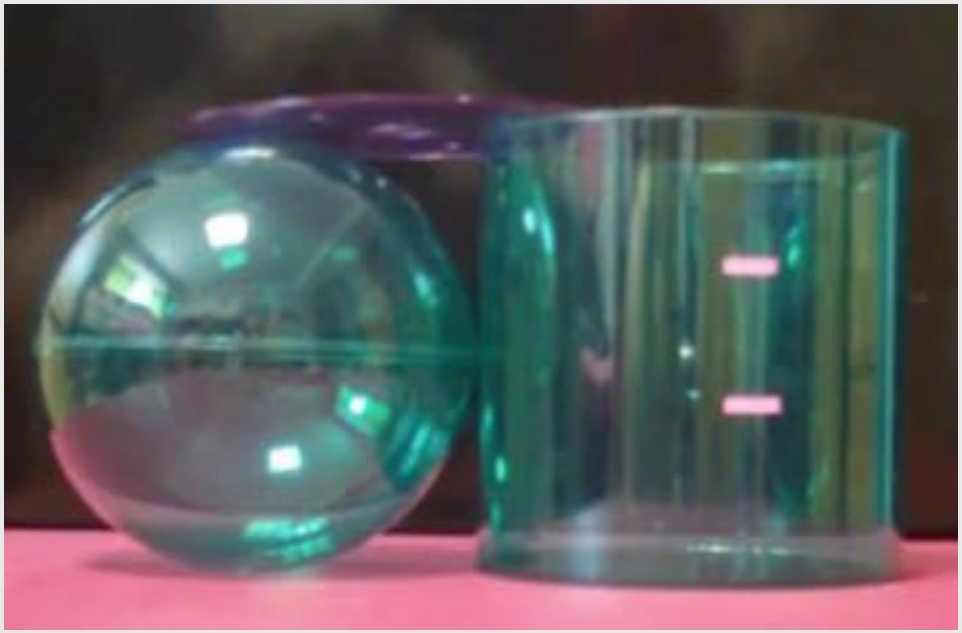
QUESTIONS:

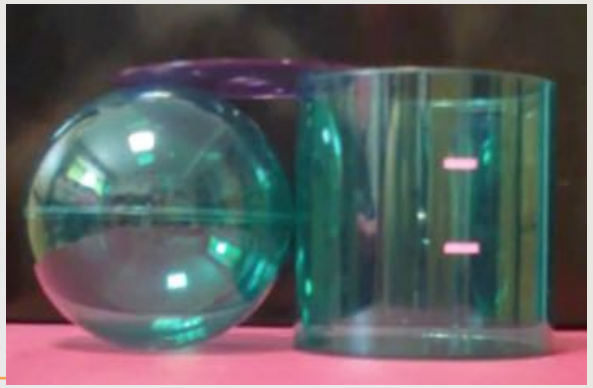

CYLINDER

Hmmm…

Based on what you saw, find a formula for the volume of a sphere.



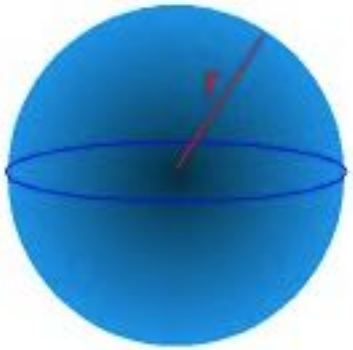
Hmmm…



Based on what you saw, find a formula for the volume of a sphere.

1 sphere = 2/3 cylinder

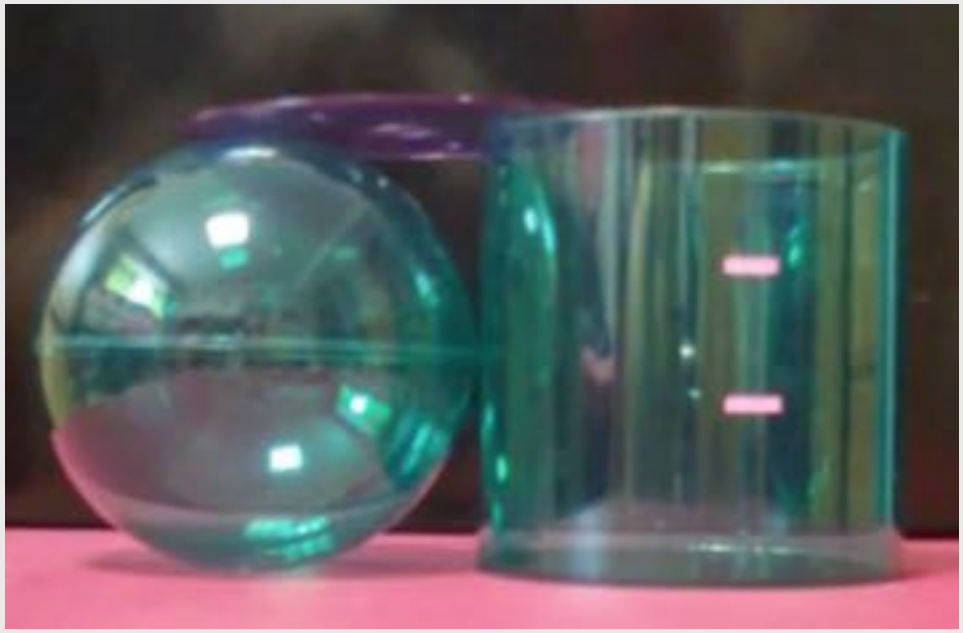
1 sphere = 2/3 ($\pi r^2 h$)



$$V = \frac{4}{3}\pi r^3$$

but h = 2r…so…

Which criterion can be assessed with this activity?

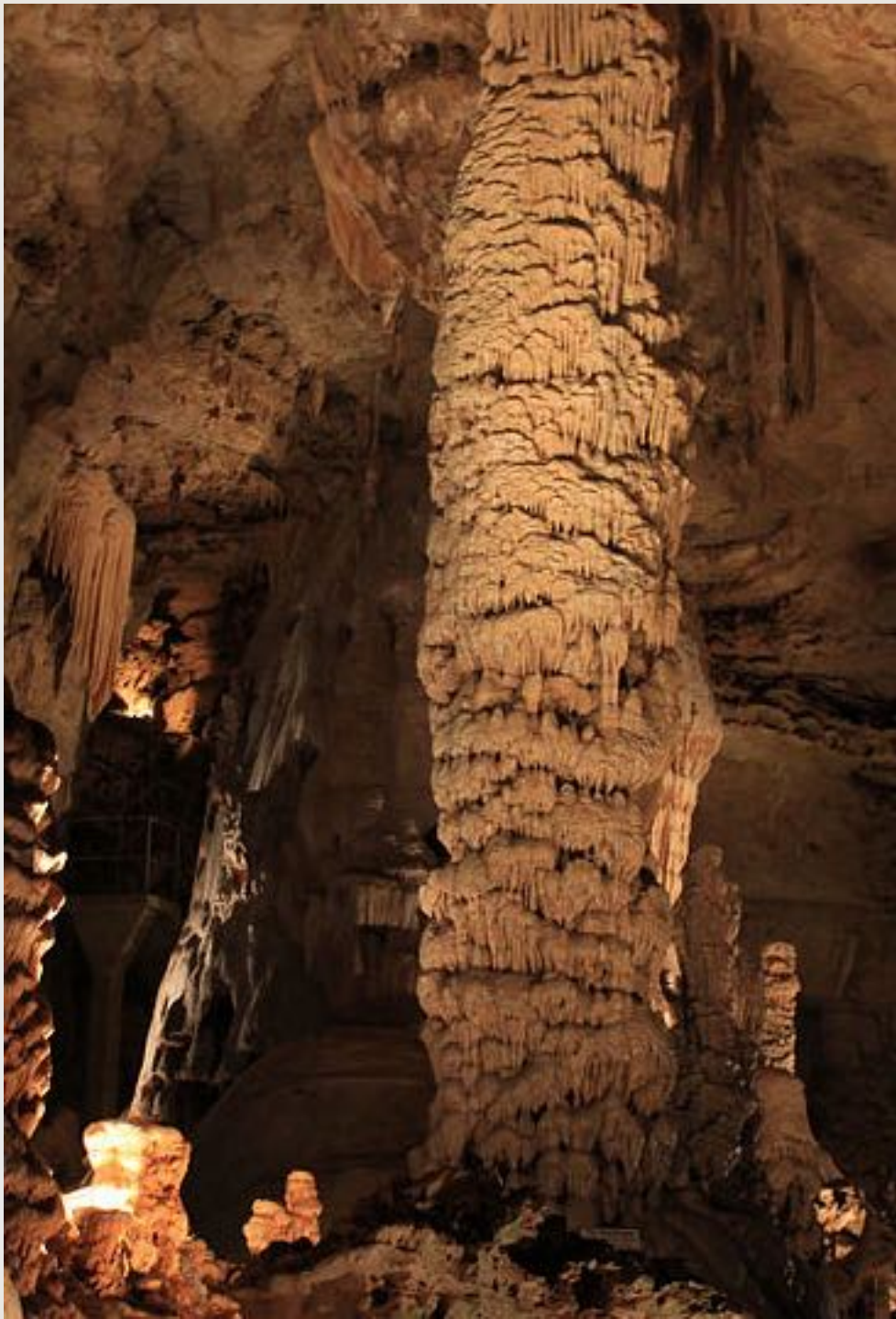


a) Criterion A
b) Criterion B
c) Criterion C
d) Criterion D
e) None of the above

All Along the Watchtower…

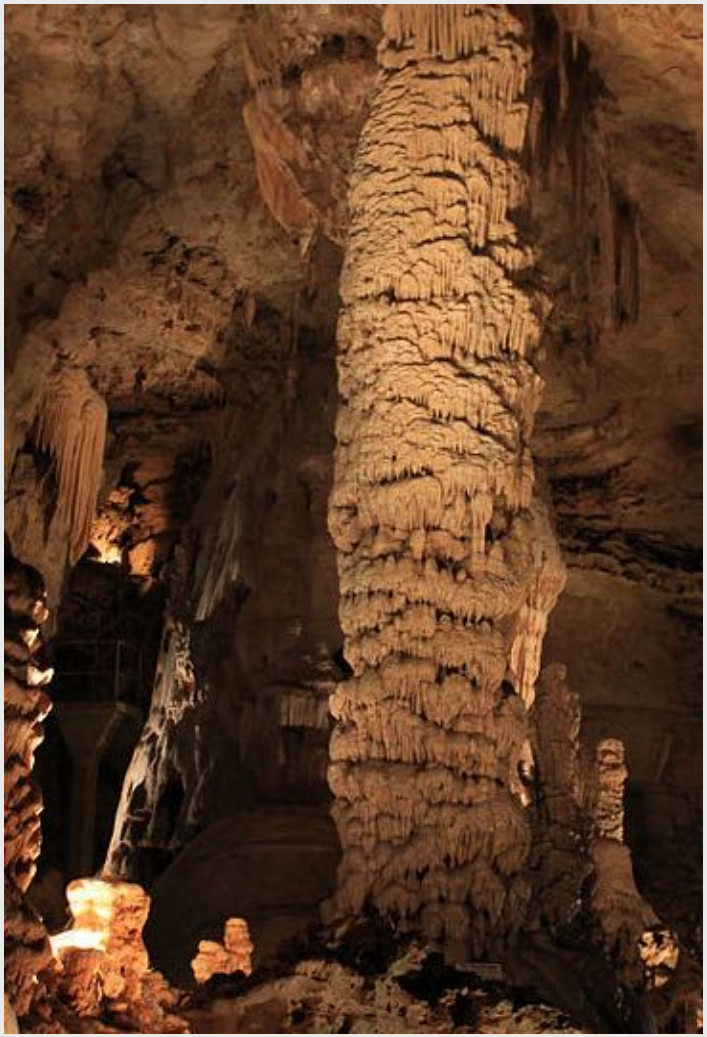
While visiting Natural Bridge Caverns, a cave in Texas, the tour guide said that columns form at a rate of approx. 1 cubic inch every 100 years.

If the Watchtower column is 50 feet tall and has a circumference of 25 feet, how long did it take for the column to form?



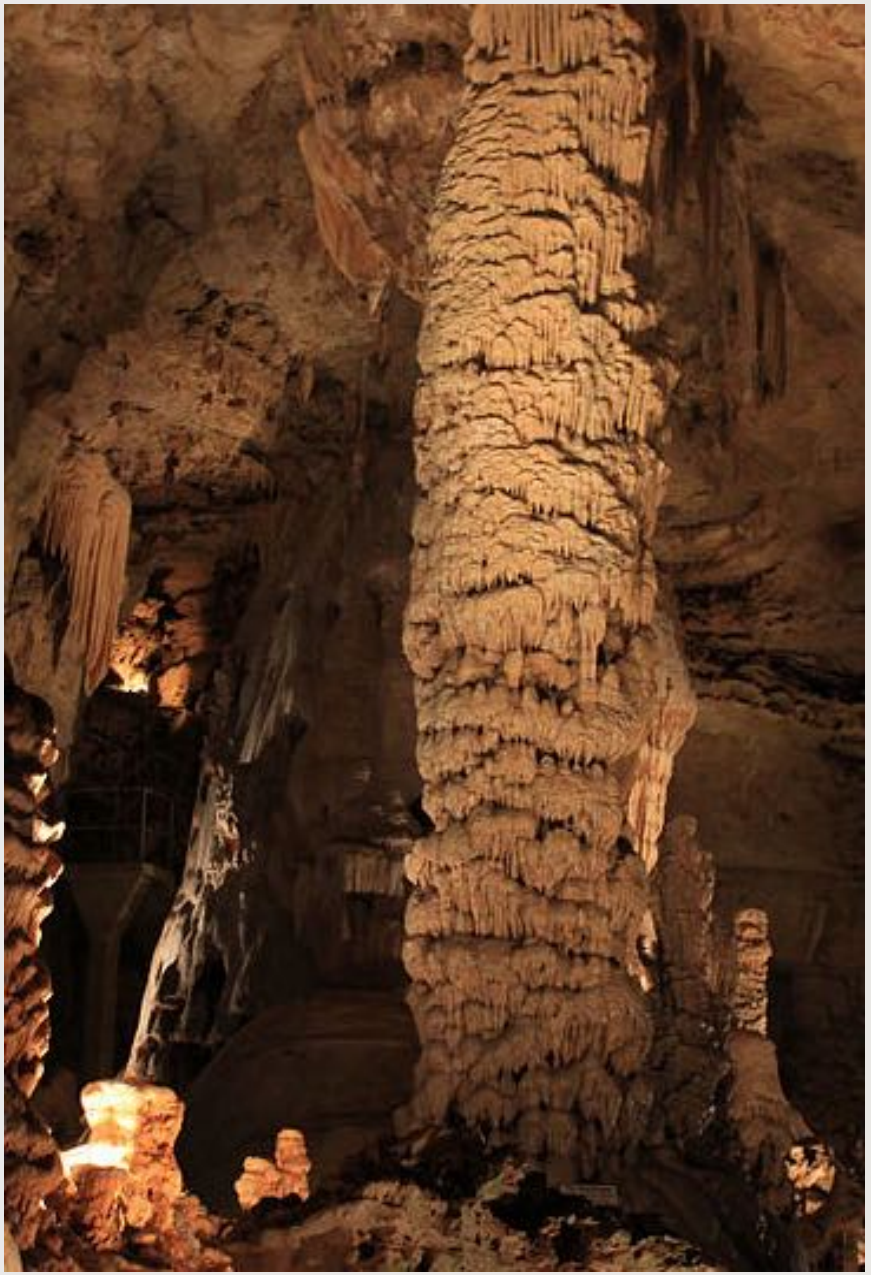
Which criteria/on can be assessed with this activity?

a) Criterion A
b) Criterion B
c) Criterion C
d) Criterion D
e) None of the above



Which Global Context is explored in this activity?

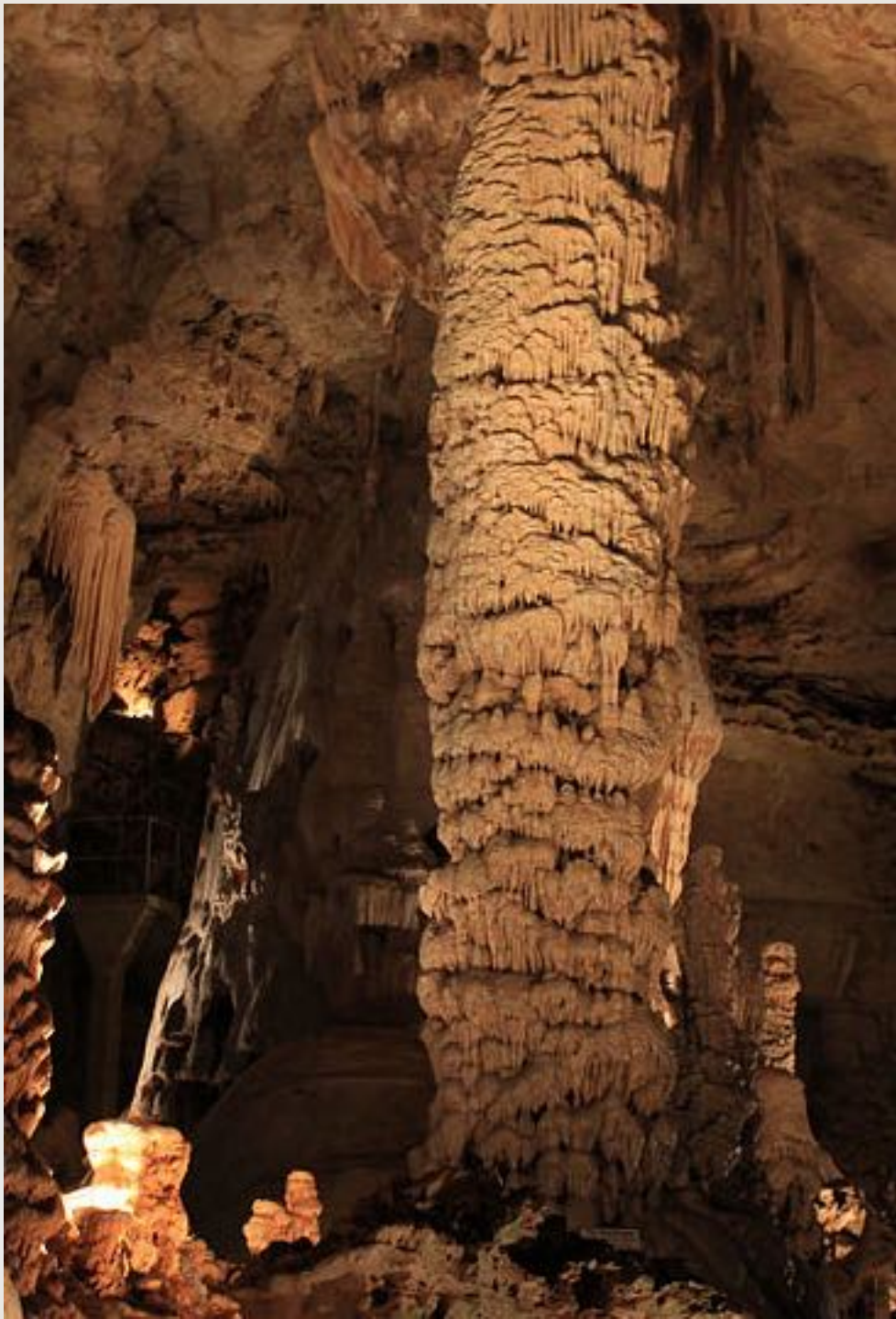
Justify your choice!



What next?

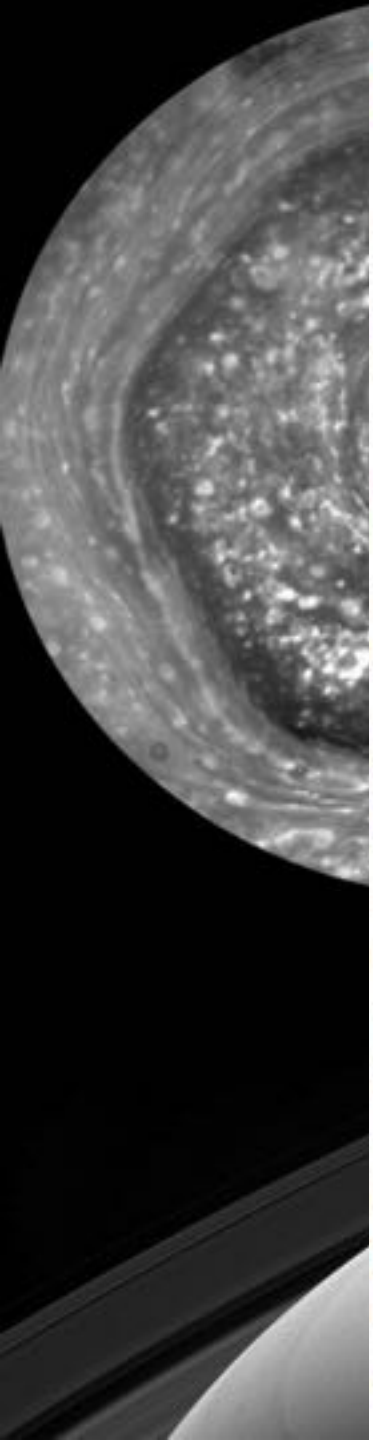
For a unit on ***perimeter, area & volume*** this is a nice application of the content and could be either part of a lesson or practice or even the summative task…

…but how does that turn into an entire unit?



Columnar Basalt

Other 3-d shapes in natural landscapes



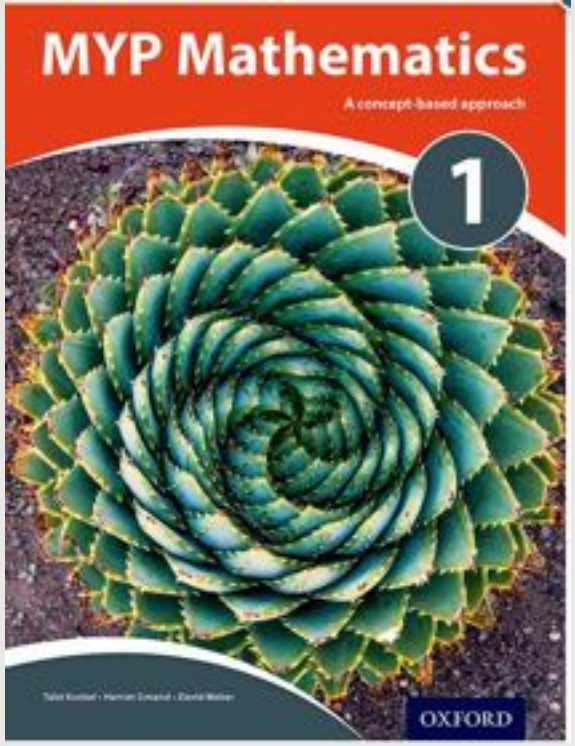
Summative assessment

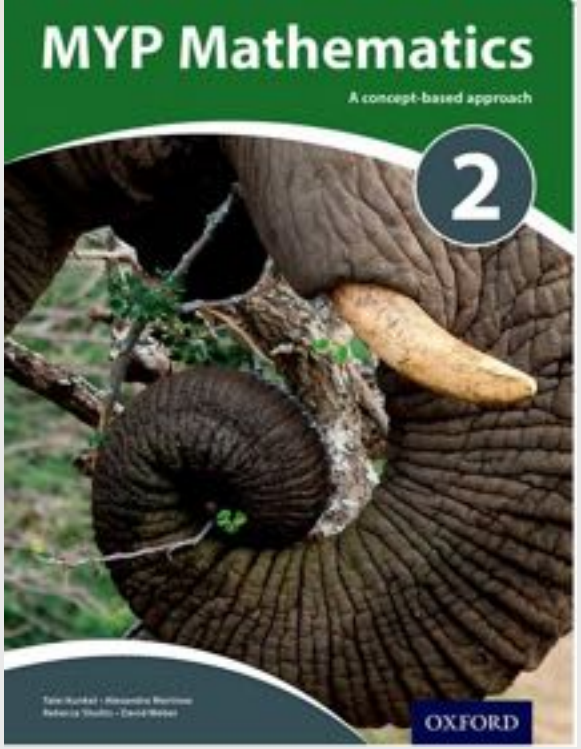
The subway system in Montreal, Canada, called 'the metro', opened in 1966 with 26 stations on three separate routes (also called 'lines'). Building the tunnels for the metro involved removing an incredible amount of dirt and rock that was then used to enlarge and even create islands, such as Ile Notre Dame, in the St. Lawrence River near the city. In this task, you will make a proposal to the city planner for the creation of two islands with the material excavated from the construction of a subway system.

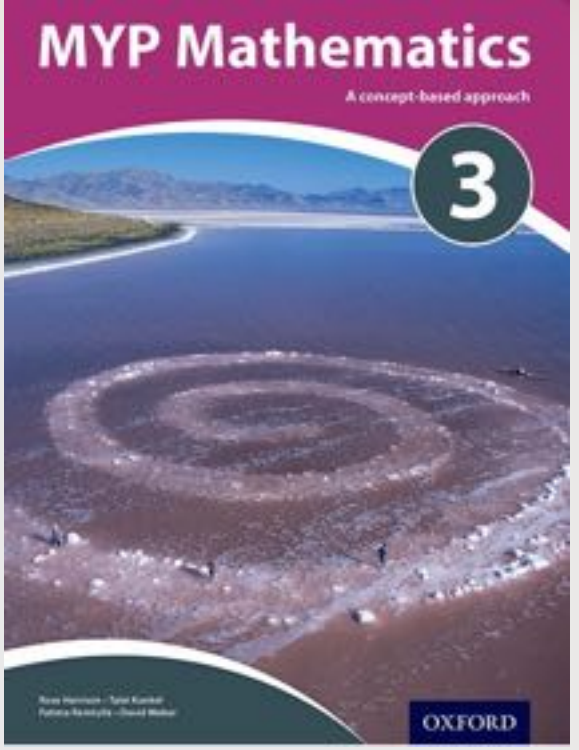
In order to make the 50 km of tunnels for the subway, a tunnel boring machine (TBM) will be used that creates rectangular tunnels with sides of 8 m and a height of 6 m. Within the system, there will be 40 stations, each designed in the shape of a rectangular prism measuring 180 m in length, 14 m in height and 20 m in width.

You will create two design proposals, each consisting of two islands. The islands will sit in a river that is 30 m deep, and they will need to be flat, with at least 10 m of land above the level of the water. In order to retain the dirt and give stability to the island, concrete blocks will be placed in the shape of each island and then filled in with the excavated dirt. These blocks will extend all the way from the bottom of the river to the ground level of the island.

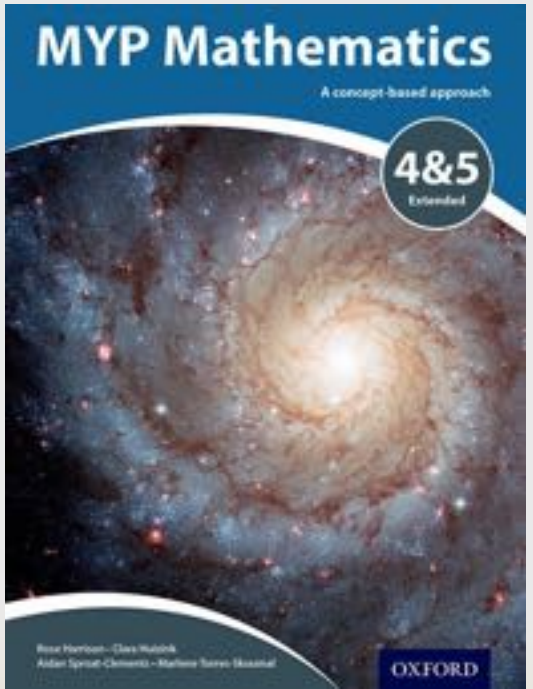

FROM THE STUDIO THAT BROUGHT YOU GUARDIANS OF THE GALAXY
ANT-MAN


MYP Mathematics
A concept-based approach
1
OXFORD


MYP Mathematics
A concept-based approach
2
OXFORD


MYP Mathematics
A concept-based approach
3
OXFORD


MYP Mathematics
A concept-based approach
4&5
Standard
OXFORD


MYP Mathematics
A concept-based approach
4&5
Extended
OXFORD

From A to D: Assessment in the MYP

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