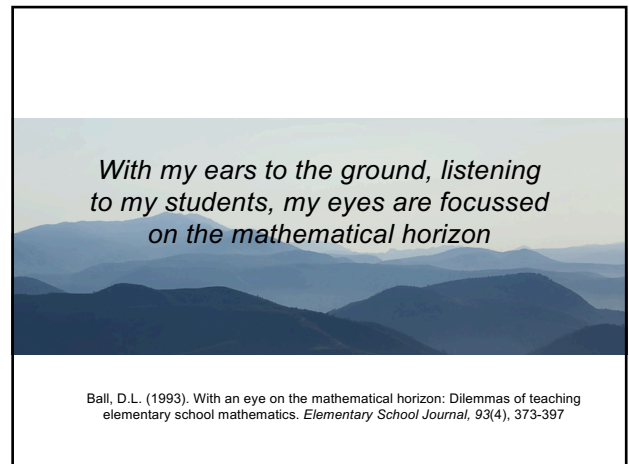
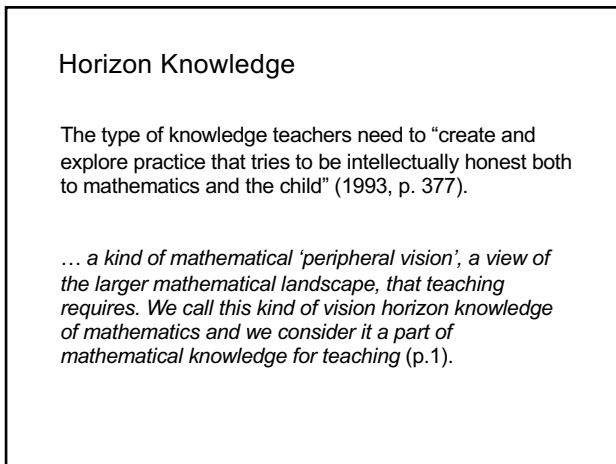


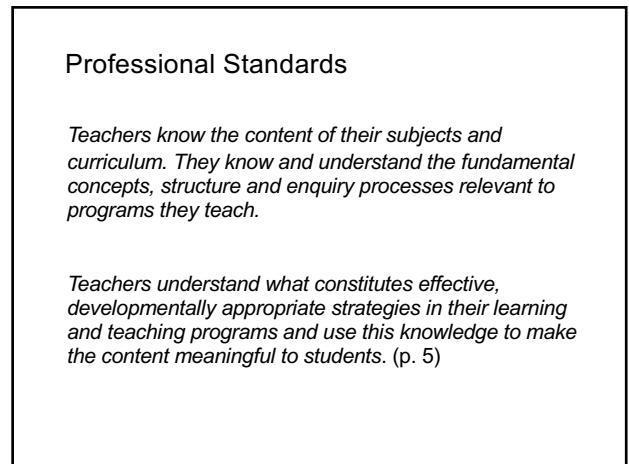
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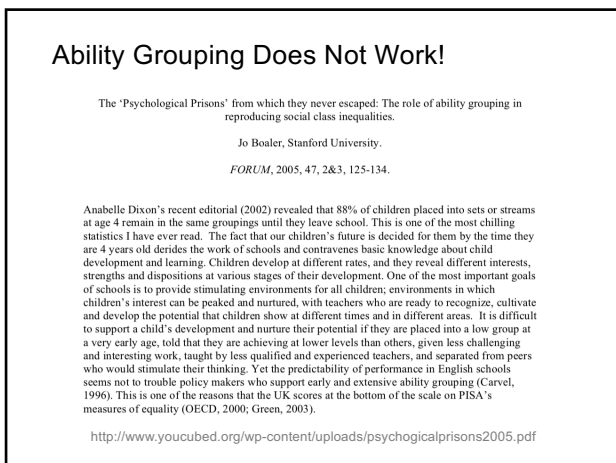
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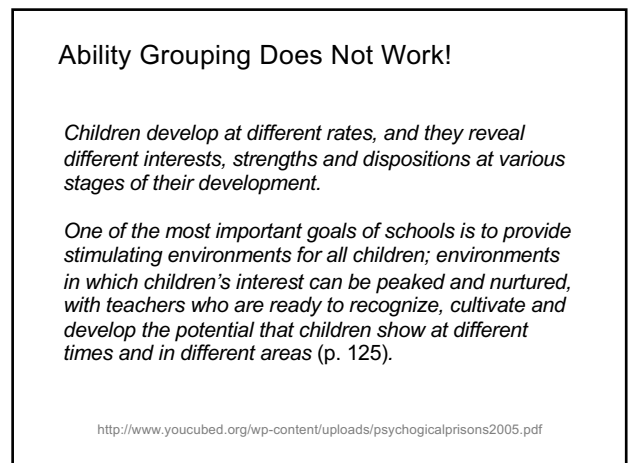
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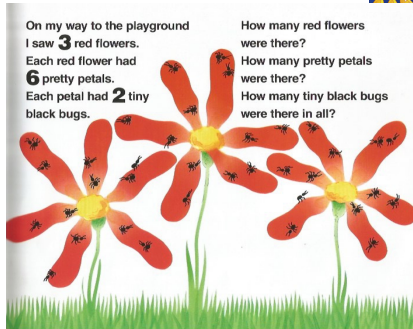


5



6

For each ...



On my way to the playground I saw **3** red flowers. Each red flower had **6** pretty petals. Each petal had **2** tiny black bugs.

How many red flowers were there?
How many pretty petals were there?
How many tiny black bugs were there in all?



13

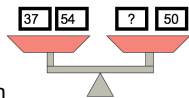
Minntos ...



Minntos are packed in rolls of 10.
10 rolls are packed into a tray.
How many trays and how many rolls are needed for 782 Minntos?

14

Without Calculating ...



Without calculating, write a number in the box to make the number sentence true.

Explain your reasoning.

$$37 + 54 = \square + 50$$

$$63 - \square = 60 - 14$$

15

Square Tiles ...

Make and draw as many different rectangles as you can using 24 square tiles?



Mix A
2 cups concentrate
3 cups cold water

Mix B
1 cup concentrate
4 cups cold water

Mix C
4 cups concentrate
8 cups cold water

Mix D
3 cups concentrate
5 cups cold water

Mixing Fruit Juice ...

16

Pikelets ...

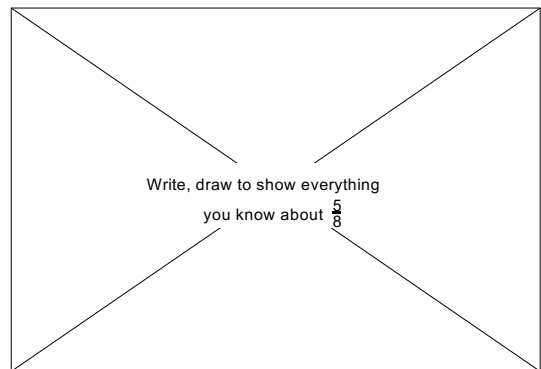


If 3 quarters of a cup of flour makes 15 pikelets how many pikelets could be made with half a cup of flour?

Explain your reasoning.

17

Everything you know about ...



Write, draw to show everything you know about **cats**

18

Marbles ...

There are 48 marbles in a bag.
Each marble is either red or blue.
There are 5 times as many blue marbles as there are red marbles.
How many **red** marbles are there?

Explain your reasoning.

- 40 There are 56 sheep in a paddock.
Each sheep is either white or black.
There are 6 times as many white sheep as there are black sheep.
How many **black** sheep are in the paddock?

2016 Year 5 Numeracy NAPLAN test

19

Post and Rail Fence ...

Post-and-rail fences are made by placing lengths of timber ('rails') between wooden posts. For example, a 4-post, 8-rail fence might look like this:



Imagine you are a fencing contractor specialising in post-and-rail fences. Design and quote for a post-and-rail fence that uses 48 'rails'. How might your quote vary for different clients?

Explain your reasoning.

20

Penguins ...

The rangers on a coastal wildlife reserve captured, tagged and released 328 penguins.

A few months later, they captured 200 penguins and found that 64 of them were tagged.

About how many penguins would you estimate to be in the reserve?



21

Holiday Destinations ...



The table shows how many holiday packages were sold to popular destinations in 2017 and 2018 by a travel agency.

The Manager of the travel agency said that the Gold Coast was a more popular holiday choice in 2017 than in 2018. Do you agree with the Manager's statement? Use as much mathematics as you can to justify your answer.

	New Zealand	Bali	Gold Coast	Tasmania	Hawaii
2017	15	45	36	24	30
2018	30	72	44	20	34

22

'This Goes With That'

An activity that explores data representation, proportion and percent

1. Collect survey data (e.g., favourite sport, fast food, type of television program, ...)
2. Discuss how this might be represented and communicated
3. Make a strip graph by deciding on a scale (e.g., 3 cm equals 1 vote), join the ends to make a circle then use a 100-bead circle to ...



What possibilities are there?

From Maths300

23

Feral Cats:

35 feral cats were estimated to live in a 146 hectare nature reserve.

27 cats were estimated to live in another nature reserve of 103 hectares.

Which reserve had the biggest feral cat problem?



(Dianne Siemon, 2005)

24

Multiple ways of seeing:

1. How much does a T-shirt cost?
And how much is a soda?
Give a reasoning, and show how you have got your answer.

one t-shirt costs \$18.00 because 1 t-shirt and 1 soda are \$22.00. they leave 2 sodas in the lower picture and \$9.00 so 1 soda is \$4.00 and $22 - 4 = 18$ so one t-shirt costs \$18.00

How much does a T-shirt cost?
And how much is a soda?
Give a reasoning, and show how you have got your answer.

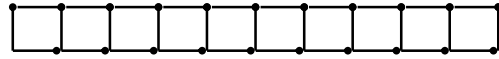
counting on
2 t-shirts 2 cups then
1 t-shirt 3 cups then I do
0 t-shirts 4 cups - almost ready
price was 44 - less 1 t-shirt:
30 - less 1 t-shirt:
left $16 \div 4 = 4$ -

(De Lange, 1996)

25

Max's Matchstick Problem (From SNMY, 2003)

Without counting, work out how many matchsticks are needed to make 10 squares.



Max's solution
 $11 \times 2 + 9$

Di's solution
 $10 \times 3 + 1$

Jo's solution
 $4 \times 10 - 9$

Rob's solution
 $4 + (9 \times 3)$



Do each of these strategies work? Why?
Explain each person's thinking. Use each strategy to work out how many matchsticks for 5 squares, 23 squares?

26

How a Year 4 to 6 teacher used this

Explain each person's thinking ... What do you notice? What stays the same what is different? How is it different?

Max is counting pairs	Jo counts all then takes away the ones she has counted twice	Di is counting 'C's'	Rob is counting the first square then 'Ds'
$11 \times 2 + 9$	$4 \times 10 - 9$	$10 \times 3 + 1$	$4 + (9 \times 3)$
$6 \times 2 + 4$	$4 \times 5 - 4$	$5 \times 3 + 1$	$4 + (4 \times 3)$
$2(n + 1) + (n - 1)$	$4n - (n - 1)$	$3n + 1$	$4 + 3(n - 1)$

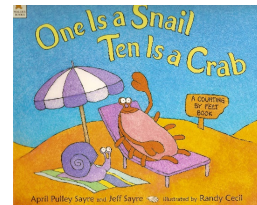
These expressions were re-arranged to show that they were all equivalent to $3n + 1$

27

One is a Snail ...

How many different ways can you rename 36?

- 1 is a snail
- 2 is a person,
- 3 is a person and a snail
- 4 is a dog,
- 5 is a dog and a snail
- 6 is an insect,
- 7 is an insect and a snail
- 8 is a spider,
- 9 is a spider and a snail
- 10 is a crab ...



28

Relational Thinking:

Loretta has written the following number sentence

$$34 + 29 = 33 + 30$$

She did not have to add up the numbers to know this. Why?

Write a number in each box to make a true statement. Explain your working.

$$73 + 49 = 72 + \square$$

$$99 - \square = 90 - 59$$

$$746 + 262 + \square = 747$$

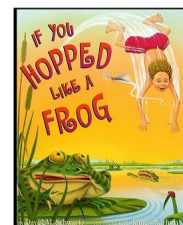
From Max Stephens (MERGA, 2006)

29

How far ...

Proportional reasoning refers to detecting, expressing, analysing, explaining, and providing evidence in support of assertions about proportional relationships.

The word reasoning further suggests that one uses common sense, good judgement, and a thoughtful approach to problem solving, rather than plucking numbers from word problems and blindly applying rules and operations (Lamon, 2007, p. 647)



How far could you hop?
Interesting fact: Frogs can jump 20 times their own length

30

Father and son:

At the present time a father is 3 times as old as his son.

In ten years time, he will be exactly twice his son's age.

How old are they at the present time?



31

Painters:

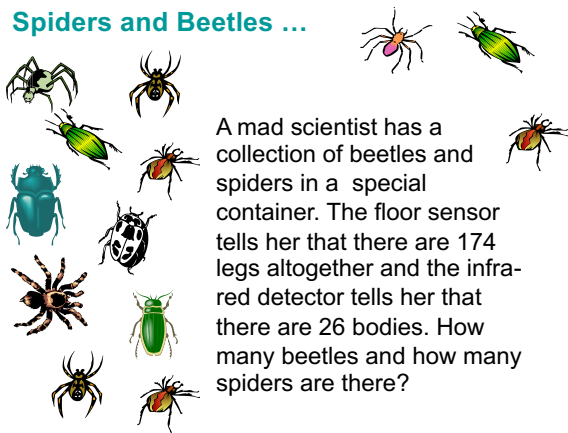


It took 3 men 3 days to paint the inside of the house.

How long will it take 2 men?

32

Spiders and Beetles ...



A mad scientist has a collection of beetles and spiders in a special container. The floor sensor tells her that there are 174 legs altogether and the infra-red detector tells her that there are 26 bodies. How many beetles and how many spiders are there?

33

The Gatekeeper's Task ...

A gatekeeper in an adventure game has a collection of triangles, squares and pentagons in a black bag. You are told that there are 17 shapes in the bag, the total number of vertices is 66, and the total number of edges is 66.

To pass through the gate you must tell the Gatekeeper how many of each shape there are in his bag.

You are allowed to ask one question only.

34 diagonals
or 5772 degrees

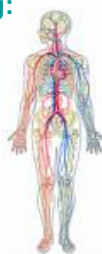


© Dianne Simon, 1996

34

Problem Solving:

Some areas of your skin have over 2,410,000 microbes per cm^2 . How many would live on 1 m^2 of skin?



Given that there are about 160,934,000 metres of blood vessels in the average human body and an extra kilogram of fat requires 708,000 m of blood vessels.

What questions might you ask?



Droplets of moisture from a sneeze have been measured travelling at 165 km/hour. How many metres/sec is this?

From the Guinness Book of Records (also HBJ Mathematics)

35



Butterflies

2 drops of nectar are needed to feed 5 butterflies. How many butterflies could be fed with 12 drops of nectar? How many drops of nectar are needed to feed 63 butterflies?



Feral Cats

35 Feral cats were found in a 146 hectare nature reserve. 27 feral cats were found in a 103 hectare reserve. Which reserve had the biggest feral cat problem?



Samantha's Snail

Samantha's snail covered 1.59 metres in 6 minutes. How far might Samantha's snail travel in 17 minutes (in metres)?

Bargain Price

Juli bought a dress in an end-of-season sale for \$49.35. The original price was covered by a 30% off sticker, but the sign on top of the rack said "Now an additional 15% off already reduced prices". How could she work out how much she had saved? What percentage of the original cost did she end up paying?



36

A problem given to Vietnamese third graders

Place digits 1-9
in empty cells to
make this
sequence of
operations true

		-		66
+	×		-	=
13	12		11	10
×	+		+	-
÷	+		×	÷

9! or 362,880 ways ... or is it?

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