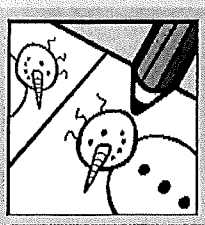


Draw a diagram

Rationale

Drawing a diagram helps children to demonstrate what they know about a problem. By drawing a picture of the data, they produce a concrete version. The problem itself becomes clearer, and a solution becomes apparent. Ideally, in time, students will be able to deduce an equation for future use. However, this is not the aim of these tasks.

Teaching *Draw a Diagram*

The following items should be considered in the teaching of problem solving using Draw a diagram.

A Types of diagrams which are commonly used.

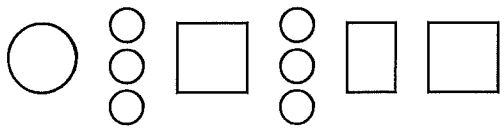
B The 4 main skills students are expected to master.

A Types of diagrams used

1 Number lines where  will show values on the line.

2 Pizzas (for fractions). Diagrams must show equal parts to be viable.

3 Forms of pictures — views from above.



tree posts house people car animal

4 Tree Diagrams will illustrate the patterning of data where several objects are related to one other, eg shirts with shorts.

B Main skills

1 Choose the diagram type

Each page gives practice at one diagram type. Students should review the type of problem and the method of diagramming. For practice give oral problems to discuss types of diagrams to be used. Solve by demonstrating the diagram on the board.

2 Convert data to a visual format

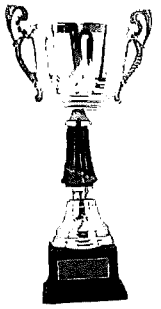
Students should use plenty of space and leave the diagram in place for marking and sharing. Credit may be given for a good attempt at drawing the diagram to encourage students to place importance on 'process' as well as 'solution'.

3 Check the solution

The solution should be checked by going back to the original data to be sure that it has all been correctly understood.

4 Explain the solution

The ability to verbalise the solution and answer questions about it, demonstrates good mathematical understanding. eg Why did you choose the tree diagram? How did you show the frog's leaps?



Worksheet 1

NUMBER LINE DIAGRAMS 1

There is a selection of diagrams from which the students choose. This is aimed at teaching the students to obtain meaning from number lines.

In oral lead-up work, place a number line on the board and have students tell a story to match it. Verbalising the story behind any number line is important as they will then be able to judge which number line tells the correct story.

Worksheet 2

EVERYDAY TASKS 1

It is important for the students to highlight the main pieces of data and match them to the appropriate diagrams. Once again, giving oral practice as a class will assist students to see the correct meaning of diagrams and what they are saying. Verbalising what the diagram looks like and what it portrays is an important skill for understanding.

Worksheet 3

FRACTION FUN

Fractions and pizzas go well together because of the ease of cutting up circles to make fractional pieces. Fractions are just names for objects — 1 quarter is just like 1 pineapple or 1 tree. 'Quarter' is just a name for 1 of 4 equal parts. 11 quarters can be counted up and since 4 of them make 1, then 11 of them will make $2\frac{3}{4}$.

Worksheet 4

PLAYTIME

Students will want to solve these without doing the drawing, but insist on the drawings as it reinforces the correct data from the problem. Check the results by having students explain their diagrams.

Worksheet 5

NUMBER LINE DIAGRAMS 2

These diagrams tell the story with visuals, not words. The first two problems have the beginnings of the solution as assistance, but 3 and 4 leave the task to the students. Highlight important data and check that the diagram relates to the narrative at the end.

Worksheet 6

EVERYDAY TASKS 2

These diagrams can be related to finding factors of given numbers. Also, some students can use these diagrams to illustrate their tables of multiples.

Worksheet 7

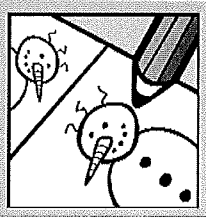
THE TROPHY SHELF

Organised rearranging should be encouraged. Once the order for the first row is decided, for the second row there should be only one change — eg (a, b, c; a, c, b; – a at the beginning) (b, c, a; b, a, c; – b at the beginning) (c, a, b; c, b, a – c at the beginning).

Worksheet 8

TREE DIAGRAMS

This may be a new concept for Years 3 and 4. Talk your students through the example given. Explain that the benefit of these drawings is that there is organisation of the data, and the record stays in place for checking later. This visual presentation of written data helps students see how the problem is being solved.



Name Date

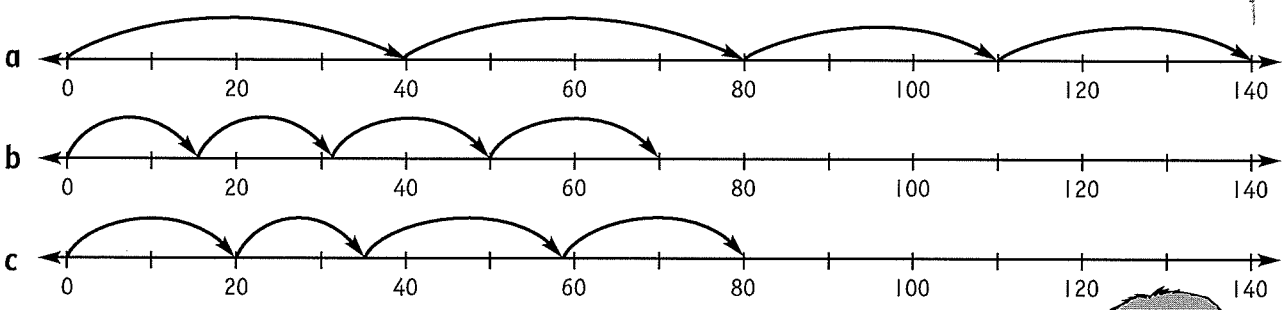
Number line diagrams 1

Which number line correctly shows the way to work each problem?

1 A flea makes 4 jumps of 15 cm, 17 cm, 18 cm and 20 cm.

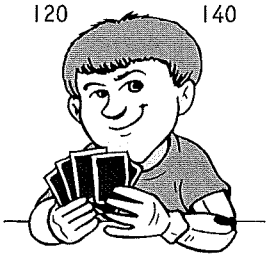
How far has it jumped?

Solution

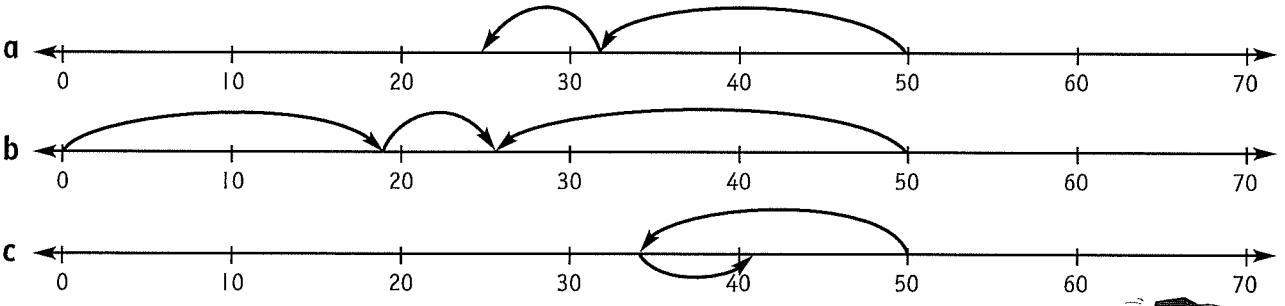


2 John had 50 cards, lost 17 and was given 8 more.

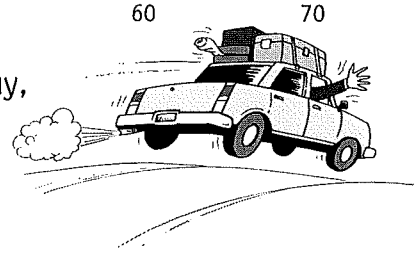
How many does he now have?



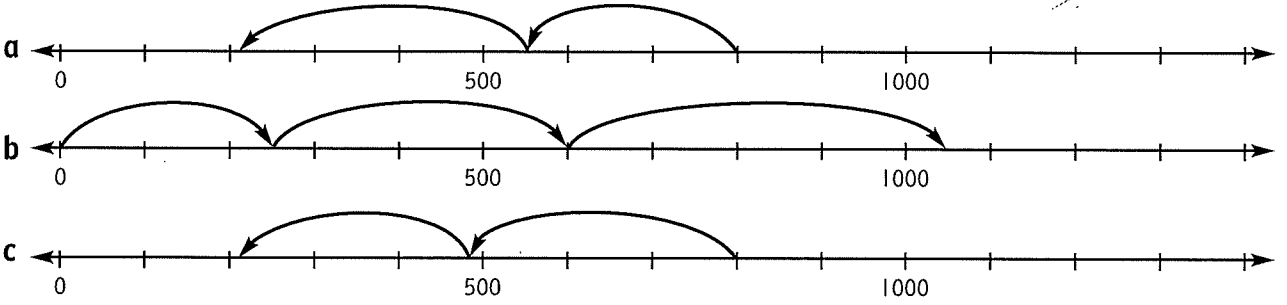
Solution

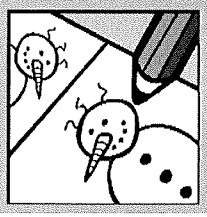


3 We were 800 km from home. Dad drove 250 km towards home one day, and 324 km the next. How far were we still from home?



Solution





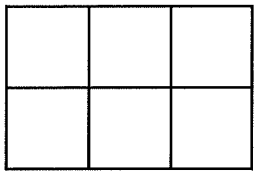
Name Date

Everyday tasks 1

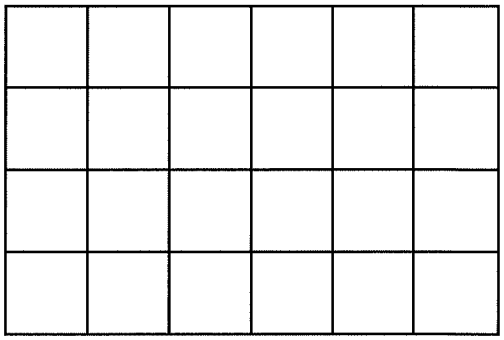
Which diagram correctly shows the answer to each puzzle?

1 If I can pack 6 cubes into a rectangular box, how many cubes can I pack into a box twice as long and twice as wide as the original? _____

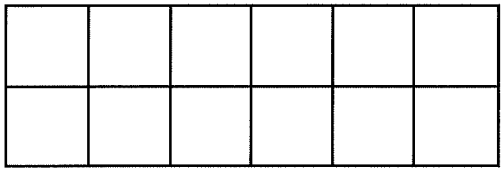
a



b



c



2 I place a blue chalk mark at the beginning of my first step, then a blue chalk mark at the end of each step.

How many blue chalk marks will I make for 8 steps? _____

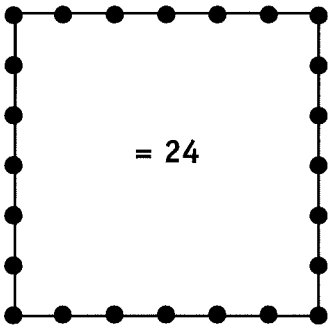
a × × × × × × × × ×

b × × × × × × × ×

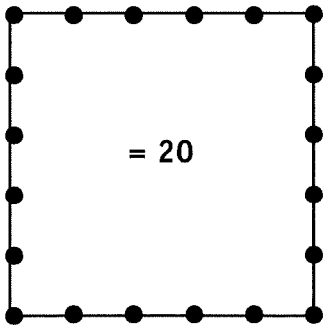
3 I have to put 5 posts along each side of my square cubby house, including the corners.

How many posts will I need? _____

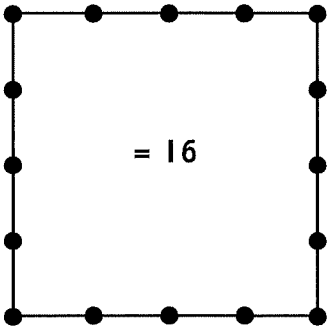
a

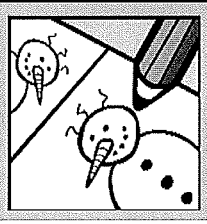


b



c



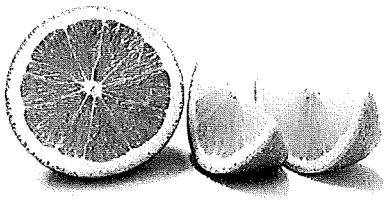


Name Date

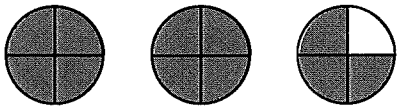
Fraction fun

It is best to draw diagrams when fractions are involved. Choose which diagram is used to illustrate and solve each problem.

1 If I have to give $\frac{1}{4}$ of an orange to each of 11 girls in my team, how many oranges will I need? _____

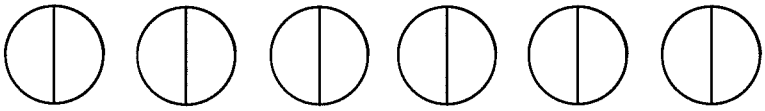


a = $2\frac{3}{4}$



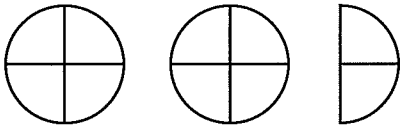
b = 11

c = 6

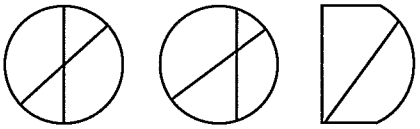


2 If I cut $2\frac{1}{2}$ pizzas into quarters, how many $\frac{1}{4}$ slices will I get? _____

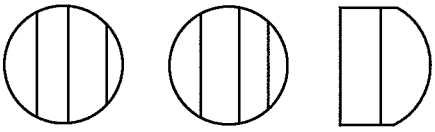
a = 10



b = 10

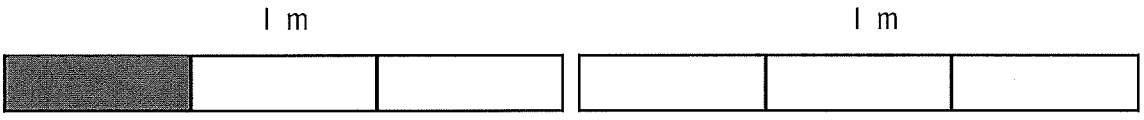


c = 10



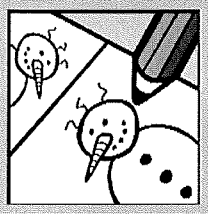
3 We need to use $\frac{1}{3}$ m of ribbon to tie each parcel. How many metres of ribbon will we use to tie 5 parcels? _____

a



b

c



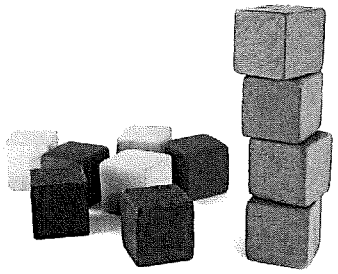
Name Date

Playtime

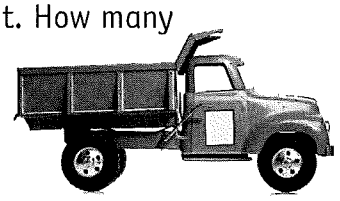
Who likes to experiment when they play? Everyone!

1 Jak wants to build a tower with his blocks. He begins with 8 blocks on the bottom row and puts one less block on each row as he builds. How many blocks will he need to build his tower?

Answer



2 When Jak lines up his best Trumper Trucks, the line stretches right across the floor. In the centre of the line is his favourite, 'Trekker', and there are 6 others to its right. How many trucks are in the line?

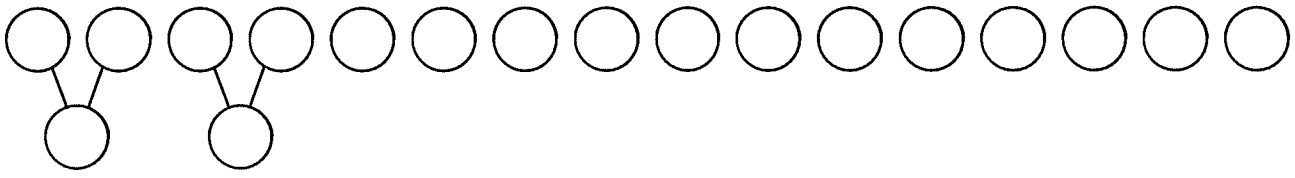


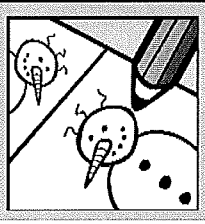
Answer

Draw the line of trucks.

3 Jak races his trucks and the loser has to retire. He has 16 trucks racing, and they race off in pairs. How many races will he have before he gets the winner?

Answer





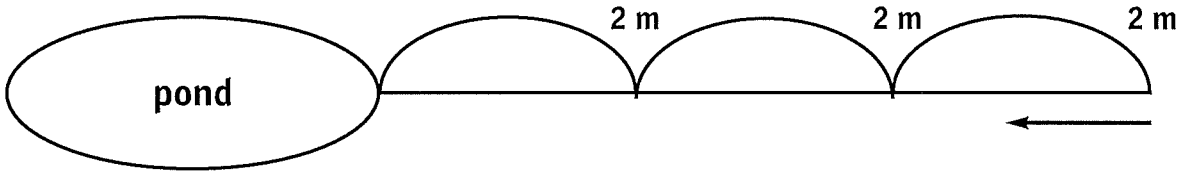
Name Date

Number line diagrams 2

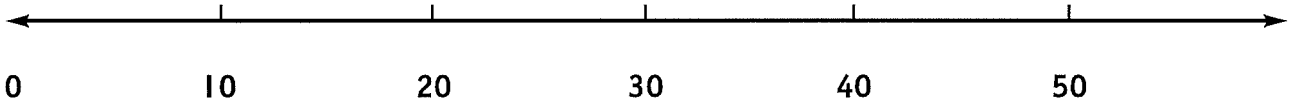
Draw diagrams to help you see how to solve these problems, using types of number lines.

1 Froggy Frogg has made 3 leaps of 2 metres away from his pond then he makes 4 leaps of 1 metre each back towards his pond. How far is he from his pond now? _____

Complete the diagram.



2 Year 4 raised $12 on Monday, $6 on Tuesday, spent $5 on advertising Wednesday, raised $12 on Wednesday and another $10 Thursday. Show this on the number line.

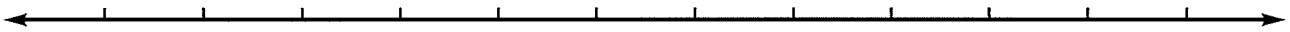


3 Bobby Beetle walks 2 m each day but has to rest every fourth day. How far from home will he be in 10 days? Show the solution on a number line.

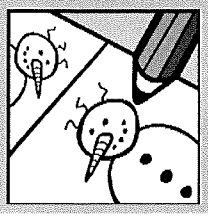
Home

4 Giggy began her project at 4 pm. She took 20 minutes to assemble all the materials, 10 minutes to make a plan, 15 minutes to lay out the background, 40 minutes to paint it and 20 minutes to add the finishing details. When did she finish her project?

1 section = 10 mins



4 pm

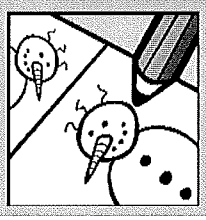


Name Date

Everyday tasks 2

1 After the Nifty Knitters had knitted many squares, they asked the Speedy Sewers to sew them into rugs. However, they only told the Speedy Sewers to put 36 squares in a rug, not how they should be arranged. Every rug turned out differently. Draw diagrams to show how many different rugs were made using 36 squares in each rug.

2 We had to pack new ping-pong balls into packages. We found that there were many different ways of packing 24 balls in a box. Draw the different ways the ping-pong balls could be packed in their single-layer boxes.

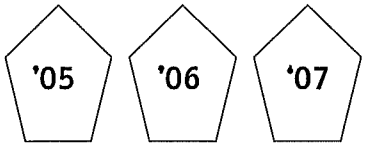


Name Date

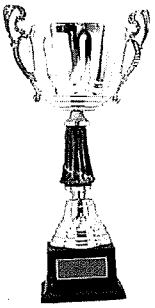
The trophy shelf

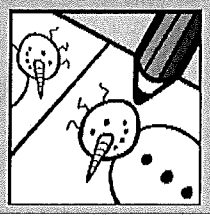
The Affaletic family plays many sports between them and they are amazingly successful at winning. They have many winner's trophies to keep.

1 Pedro Affaletic plays soccer and he won the Best Player Award in 2005, 2006 and 2007. How many different ways can he arrange them on the shelf before they will stand in the same place again? The first row has been done for you. Draw the different arrangements — label the years.



2 Angie Affaletic is a champion diver. Her trophies are for the 3 m Dive (1), 5 m Dive (2), Springboard Dive (3) and Synchronised Dive (4). How many ways can she arrange her trophies? The first row is done for you.





Name Date

Tree diagrams

Use tree diagrams when you need to work out how many combinations of a set of options there are.

eg Kennet always likes tomato or cheese in his sandwiches. He will have lettuce, ham or avocado with the tomato or cheese. How many different choices does he have for sandwiches for his lunch?

= 6 different sandwiches.

1 Ralph the Radical Roof Builder builds roofs of tile or aluminium. He paints them either blue, red or brown. Draw your own tree like the one above to show how many different looking roofs he can produce.

TILE **ALUMINIUM**

= _____ different roofs.

2 Grandma wanted to name her new puppy either Kandy or Krispy as its first name and Bandi, Dancer, Fancy or Skipp as its second name. How many different names does she have to choose from? Make your own tree to illustrate her choices.

= _____ choices.