Reasoning and Problem Solving
Step 1: Pictograms

National Curriculum Objectives:

Mathematics Year 3: (3S1) Interpret and present data using bar charts, pictograms and tables
Mathematics Year 3: (3S2) Solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables

Differentiation:

Questions 1, 4 and 7 (Reasoning)
Developing Explain if the statement is correct when describing the pictogram. Images represented with the value of 1 or 2 with no half pictures.
Expected Explain if the statement is correct when describing the pictogram. Pictogram includes half pictures.
Greater Depth Explain if the statement is correct when describing the pictogram. Using commutative law to calculate a wider range of multiplication facts. Pictogram includes half and quarter pictures.

Questions 2, 4 and 8 (Problem Solving)
Developing Use the clues to work out how many images could be missing from the pictogram. Images represented with the value of 5 or 10 with no half pictures.
Expected Use the clues to work out how many images could be missing from the pictogram. Pictogram includes half pictures.
Greater Depth Use the clues to work out how many images could be missing from the pictogram. using commutative law to calculate a wider range of multiplication facts.

Questions 3, 6 and 9 (Reasoning)
Developing Use the pictogram to explain whether the statement is correct. Images represented with the value of 5 or 10 with no half pictures.
Expected Use the pictogram to explain whether the statement is correct. Pictogram includes half pictures.
Greater Depth Calculate the value of each image and complete the pictogram. Justify if the statement is correct. using commutative law to calculate a wider range of multiplication facts. Some pictograms include half and quarter pictures.

More Year 3 Statistics resources.

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Pictograms

1a. Leah has created this pictogram.

Day	Number of Hot Dogs Sold
Monday	
Tuesday	
Wednesday	
Thursday	

Key: = 2 hot dogs sold

She thinks 3 fewer hot dogs were sold on Monday than on Wednesday. True or false? Convince me.

D R

Pictograms

1b. Danish has created this pictogram.

Day	Number of Pretzels Sold
Thursday	
Friday	
Saturday	
Sunday	

Key: = 1 pretzels sold

He thinks four more pretzels were sold on Friday than on Thursday. True or false? Convince me.

D R

2a. Julia is drawing a pictogram. She knows more children swim on Wednesday than on Thursday, but fewer children swim on Wednesday than on Friday. Complete the pictogram showing one of the possibilities.

Day	Number of Children
Wednesday	
Thursday	
Friday	
Sunday	

Key: = 5 children

D PS

2b. James is drawing a pictogram. He knows more children play the keyboard than guitar, but fewer children play drums than recorder. Complete the pictogram showing one of the possibilities.

Instrument	Number of Children
Recorder	
Guitar	
Keyboard	
Drums	

Key: = 10 children

D PS

3a. Ian draws a pictogram to show the minibeasts that Year 3 saw in the garden.

Minibeast	Number of Insects 1 picture = 10 insects
Worm	
Slug	
Snail	
Ant	

We saw 40 worms.

D Is he correct? Explain your answer. R

3b. Amelia draws a pictogram to show when KS1 children have their birthday.

Month	Number of Birthdays 1 picture = 5 birthdays
January	
February	
March	
April	

20 children have their birthday in March.

D Is she correct? Explain your answer. R

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Pictograms

4a. Joe has created this pictogram.

Day	Number of Sweets Sold
Thursday	
Friday	
Saturday	
Sunday	

Key: = 4 sweets sold

He thinks twice as many sweets were sold on Saturday than Thursday. True or false? Convince me.

E R

Pictograms

4b. Ellie has created this pictogram.

Day	Number of T-shirts Sold
Wednesday	
Thursday	
Friday	
Saturday	

Key: = 10 t-shirts sold

She thinks half the number of T-shirts sold on Friday were sold on Wednesday. True or false? Convince me.

E R

5a. Dave is drawing a pictogram. He knows more children have blonde hair than ginger, but fewer children have blonde hair than black.
Complete the pictogram showing one of the possibilities.

Hair Colour	Number of Children
Black	
Blonde	
Brown	
Ginger	

Key: = 2 children

E PS

5b. Ishani is drawing a pictogram. She knows more children have brown eyes than grey, but fewer children have green eyes than blue. Complete the pictogram showing one of the possibilities.

Eye Colour	Number of Children
Brown	
Blue	
Green	
Grey	

Key: = 4 children

E PS

6a. Sue draws a pictogram to show the children's favourite author.

Author	Number of Children 1 book = 10 children
Dahl	
Walliams	
Rowling	
Morpurgo	

Half the number of children that voted Dahl, voted Morpurgo.

E Is she correct? Explain your answer. R

6b. Jay draws a pictogram to show children's favourite dessert.

Dessert	Number of Children 1 picture = 8 children
Yoghurt	
Fruit	
Ice cream	
Custard	

Half the number of children that voted fruit, voted custard.

E Is he correct? Explain your answer. R

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Pictograms

7a. Maria has created this pictogram.

Vegetable	Number of Vegetables Sold
Potato	
Broccoli	
Cabbage	
Pepper	

Key: = 6 sold

She thinks the difference between the number of peppers and broccoli sold is 12. True or false? Convince me.

GD R

7b. Shane has created this pictogram.

Toy	Number of Toys Sold
Doll's house	
Car	
Ball	
Rattle	

Key: = 12 sold

He thinks half the number of balls sold is equal to the number of cars sold. True or false? Convince me.

GD R

8a. Brad is drawing a pictogram.

Flowers	Number of Children
Rose	
Sunflower	
Bluebell	
Daisy	

He knows more children like daisies than bluebells, but fewer children like daisies than roses. Complete the pictogram showing one of the possibilities, if one flower is worth 7.

GD PS

8b. Evie is drawing a pictogram.

Accessory	Number of People
Watch	
Bowtie	
Necklace	
Ring	

She knows fewer people like necklaces than watches, but more people like rings than bowties. Complete the pictogram showing one of the possibilities, if one item is worth 9.

GD PS

9a. Mary draws a pictogram to show KS2's favourite sport. The total number of children that voted is 72. She thinks each image is worth 8.

Sport	Number of Children	Total
Cricket		
Basketball		
Rugby		
Tennis		

Complete the total for each activity to see if she is correct. Prove it.

GD R

9b. Chen draws a pictogram to show KS2's favourite vehicle. The total number of children that voted is 54. He thinks each image is worth 5.

Vehicle	Number of Children	Total
Bike		
Aeroplane		
Train		
Ship		

Complete the total for each activity to see if he is correct. Prove it.

GD R

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Reasoning and Problem Solving Pictograms

Developing

1a. False. 6 fewer hotdogs were sold on Monday than on Wednesday.

2a. Various answers, for example: Wednesday = 20 and Thursday = 15.

3a. No, Ian is incorrect because they saw 50 worms.

Expected

4a. False. Only 10 more sweets were sold on Saturday than Thursday.

5a. Various answers, for example: Blonde = 6 and Ginger = 5.

6a. No, Sue is incorrect because 50 children voted Dahl and 35 children voted Morpurgo. That is a difference of 15.

Greater Depth

7a. False. The difference between the number of broccoli and peppers sold is 9 because pepper = 33 and broccoli = 24. 33 – 24 = 9.

8a. Various answers, for example: Bluebell = 7 and Daisy = 14.

9a. Mary is correct, if 72 pupils voted, each image must be worth 8. Cricket = 18; Basketball = 24; Rugby = 10; Tennis = 20; 18 + 24 + 10 + 20 = 72.

Reasoning and Problem Solving Pictograms

Developing

1b. True. Only 2 pretzels were sold on Thursday and 6 pretzels were sold on Friday.

2b. Various answers, for example: Keyboard = 80 and Drums = 10.

3b. No, Amelia is incorrect because 25 children have their birthday in March.

Expected

4b. False. Only 25 more shirts were sold on Friday than Wednesday.

5b. Various answers, for example: Brown = 28 and Green = 10.

6b. No, Jay is incorrect because 52 children voted fruit and 40 children voted custard. That is a difference of 12.

Greater Depth

7b. False. The number of balls sold = 54 and the number of cars sold = 24.

8b. Various answers, for example: Necklace = 9 and Rings = 45.

9b. Chen is incorrect, if 54 children voted, each image must be worth 6. Bike = 18; Airplane = 18; Train = 6; Ship = 12; 18 + 18 + 6 + 12 = 54.

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