Year 6 maths – Summer 2 Week beginning: 6.7.20

Theme	Volume (Lesson 4 of 5) Finding the volume of cubes and cuboids.	Volume (Lesson 5 of 5) Solving problems involving the volume of solids	CONSOLIDATION LESSON Formal methods Multiplication	CONSOLIDATION LESSON Formal methods Division	CONSOLIDATION LESSON Formal methods Multiplication and division
Factual fluency (to aid fluency)	Practise adding and subtracting decimals **Activity**	Practise using decimals in word problems **Activity**	Practise the four operations **Activity**	Practise the four operations with decimals **Activity**	Practise the four operations word problems **Activity**
Problem/ activity of the day **Remember, just like in class, you can still show the depth of your knowledge LINK**	**(Lesson 1 resources below)** **MAKING LINKS:** Last week, we found the volume of figures. Today we are continuing with that. **THINK: (support below)** Can you help me with this? My friend says that if a box has sides that are 12 mm long and the smaller box has sides that are 6 mm long, the big box must have a volume that is double the smallest box. Is this true? Our problem is on textbook page 111. Look at it now. **SEE: (model below)** *If you want a reminder of how we calculate volume you can watch the year 5 lesson video here as a recap.* Look for how to solve the problem on page 111-112 of your textbook. **DO:** Use what you have learnt today to solve: Part 1: complete the questions from textbook page 113. Check your answers before moving onto: Part 2: Workbook, Chapter 11, worksheet 4, page 95.	**(Lesson 2 resources below)** **MAKING LINKS:** Yesterday we found the volume of figures. Today we are going to solve problems involving volume. **THINK: (support below)** Can you help me with this problem? A solid metal cuboid was melted down to make cubes with 4cm sides. What is the greatest number of cubes that can be made with the volume of the melted cuboid? Our problem is on textbook page 114. Look at it now. **SEE: (model below)** *A reminder of how we calculate volume can be seen in the year 5 lesson video here.* Look for how to solve the problem on page 114, method 1 in your textbook. You may use a calculator for this task. **DO:** Use what you have learnt today to solve: Part 1: complete questions 1 and 3 from textbook pages 115-116. Check your answers before: Part 2: Workbook, Chapter 11, worksheet 5, page 96-97.	**(Lesson 3 resources below)** **MAKING LINKS:** In year 4, 5 and 6 we learnt to use the formal, vertical method to multiply. Today we are going to recap that method. **THINK: (support below)** If there are 114 flats in each block of flats, how many flats are in 24 identical blocks? *If you have online parent access this lesson is based on Year 6 textbook 6A, chapter 2, lesson 6.* **SEE: (model below)** Check the solution below. **DO:** Use what you have learnt today to solve: PART 1: Complete the questions in part 1 below. Check your answers below before moving on to: PART 2: Complete the questions in part 2 below.	**(Lesson 4 resources below)** **MAKING LINKS:** In year 4, 5 and 6 we learnt to use the formal method to divide. Today we are going to recap that method. **THINK: (support below)** 7192 people registered for a national sports camp. How many teams of 31 will there be at the camp? *If you have online parent access this lesson is based on Year 6 textbook 6A, chapter 2, lesson 11.* **SEE: (model below)** Check the solution below. **DO:** Use what you have learnt today to solve: PART 1: Complete the questions in part 1 below. Check your answers below before moving on to: PART 2: Complete the questions in part 2 below.	**(Lesson 5 resources below)** **MAKING LINKS:** This week we recapped the formal methods to multiply and divide. Today we are going to use those methods in solving word problems. **THINK: (support below)** Can you help me with this problem? We have 12 boxes of pencils. Each box of 96 pencils costs £15. The pencils are packed into boxes of 5, which are sold at £1.90 per box. If a shop sells all of these boxes what is its profit? *If you have online parent access this lesson is based on Year 6 textbook 6A, chapter 2, lesson 16.* **SEE: (model below)** Check the solution below. **DO:** Use what you have learnt today to solve: PART 1: Complete the questions in part 1 below. Check your answers below before moving on to: PART 2: Complete the questions in part 2 below.

See below for resources to support you to THINK-SEE-DO

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THINK: Our problem is on <u>textbook</u> page 111.

My friend says that if a box has sides that are 12 mm long and the smaller box has sides that are 6 mm long, the big box must have a volume that is double the smallest box. Is this true?

DO: Use what you have learnt today to solve:
Part 1: complete the questions from textbook page 113.

Check your answers before moving onto:
Part 2: Workbook, Chapter 11, worksheet 4, page 95.

<u>Deepening:</u>
Share your answers with your teacher.

What in the world has the following volume?

(a) 1 mm³
(b) 1 cm³
(c) 1 m³
(d) 1 km³

SEE: *If you want a reminder of how we calculate volume you can watch the year 5 lesson video* <u>here</u> *as a recap.*
Look for how to solve the problem on page 111-112 of your textbook.

Remember: We calculate volume of a cube or cuboid by multiplying its length, width and height.
volume = width x length x height
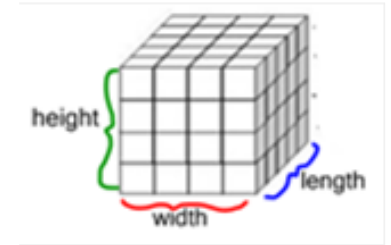
The volume of the smallest box at the top is:
W x l x h = 6 x 6 x 6 =
6 x 6 = 36 x 6 = 216 mm³

The volume of the largest box at the bottom is:
w x l x h = 12 x 12 x 12 =
12 x 12 = 144 x 12 = 1728 mm³

```
    1 4 4
  ×   1 2
    2 8 8
+ 1 4 4 0
  1 7 2 8
```
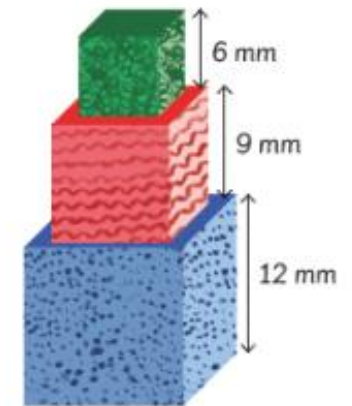
Although the length of the sides of the smallest cube are half the length of the largest the volume of the smallest cube is not half the volume of the largest cube!

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THINK: Our problem is on <u>textbook</u> page 114.

A solid metal cuboid was melted down to make cubes with 4cm sides. What is the greatest number of cubes that can be made with the volume of the melted cuboid?
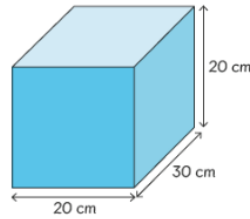
Remember: when the cuboid has been melted <u>all</u> the volume can be used to make the smaller cubes.

DO:
Use what you have learnt today to solve:
<u>Part 1:</u> complete questions 1 and 3 from textbook pages 115-116.

Check your answers before moving onto:
<u>Part 2:</u> Workbook, Chapter 11, worksheet 5, page 96-97.

Do not complete question 3.

<u>Deepening:</u>
My friend is struggling to imagine how large 1km³ is.
Write an explanation as to how he can estimate the size of 1km³.

Share your explanations with your teacher.

SEE: Look for how to solve the problem on method 1 on page 114 of your textbook. You may use a calculator for this task.

A reminder of how we calculate volume can be seen in the year 5 lesson video <u>here</u>.

First, calculate the volume of the metal cuboid so you know the amount that will be divided amongst the small cubes with 4cm sides.
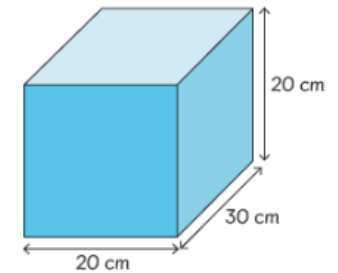
Then calculate the volume needed for each of the cubes:

$$\text{volume of metal cuboid} = (20 \times 20 \times 30) \text{ cm}^3$$
$$= 12\,000 \text{ cm}^3$$
$$\text{volume of each cube} = (4 \times 4 \times 4) \text{ cm}^3$$
$$= 64 \text{ cm}^3$$

Then divide the volume of the melted cuboid between the volume of the small cubes (you can use a calculator):

$$12\,000 \div 64 = 187.5$$
$$\text{number of cubes} = 187$$

Note: the volume divides with a result of 187.5
The 0.5 is not a complete cube so only 187 cubes can be made!

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THINK: If there are 114 flats in each block of flats, how many flats are in 24 identical blocks?

If you have online parent access this lesson is based on Year 6 textbook 6A, chapter 2, lessons 6.

DO:

Part 1: complete the questions below:
a) 217 x 14 =
b) 18 x 105 =
c) 1028 x 13 =
d) 19 x 1116 =

Check your answers before moving onto:

Part 2:

2054	2089	1344	1125	1344
x 45	x 56	x 87	x 35	x 71

1198	1657	2080	1769	1187
x 56	x 48	x 48	x 97	x 55

1774	2353	2090	1489	1096
x 37	x 51	x 90	x 43	x 25

Deepening:

Joshua has spilt some paint on his calculation.

What are the missing digits?
What do you notice?

SEE: If you want to recap formal multiplication methods we learned in year 5, watch the steps for formal multiplication here and the year 5 lesson video here.

114 x 24 =

First, write the equation in a vertical form.

Ones in the **ones place** (or column),
Tens in the **tens place** (or column),
Hundreds in the **hundreds place** (or column).

Multiply by the **ones**, then by the **tens**.

$$
\begin{array}{r}
1\ 1\ 4 \\
\times \quad 4 \\
\hline
4\ 5\ 6 \\
\end{array}
$$

$$
\begin{array}{r}
1\ 1\ 4 \\
\times \quad 2\ 0 \\
\hline
2\ 2\ 8\ 0 \\
\end{array}
$$

Finally add the two amounts to reach the total.

When multiplying 4-digit numbers you will need to include a thousands place on the left of the hundreds place.

$$
\begin{array}{r}
\text{Th} \\
1\ 1\ 4 \\
\times \quad 2\ 4 \\
\hline
4\ 5\ 6 \quad \rightarrow 114 \times 4 \\
+\ 2\ 2\ 8\ 0 \quad \rightarrow 114 \times 20 \\
\hline
2\ 7\ 3\ 6 \\
\end{array}
$$

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THINK: 7192 people registered for a national sports camp. How many teams of 31 will there be at the camp?

If you have online parent access this lesson is based on Year 6 textbook 6A, chapter 2, lesson 11.

DO:

Part 1: complete the questions below:

a) 385 ÷ 11 =

b) 572 ÷ 52 =

c) 288 ÷ 24 =

d) 408 ÷ 17 =

Check your answers before moving onto:

Part 2:

16)754   16)992   64)2432   65)5200

56)5376   68)5403   98)4018   19)624

95)1351   69)5126   67)2028   61)4636

Deepening:

A three-digit number made of consecutive descending digits divided by the next descending digit always has a remainder of 1

765 ÷ 4 = 191 remainder 1

How many possible examples can you find?

SEE: If you want to recap the division methods we learned in year 5, watch the year 5 division lesson video here.

Before we move onto division remind yourself of the language we use in division. We learnt this in year 4 and year 5:

quotient → 5
divisor → 3) 16
dividend ↗ 15
remainder → 1

Remember your steps for division:
Write down the multiples of the **divisor** so that we can easily recognise how many we have in the **dividend**.

In this division problem we need to find **how many groups of 31** there are in **7192** so we jot down the multiples of 31:

31, 62, 93, 124, 155, 186,…

Now I could partition the dividend into multiples of 31.

I can see 62 is a multiple of 31 so 6200 will be too!
6200 is 200 groups of 31
(200 x 31)
(6200 ÷ 31 = 200)

That leaves 992.

I know I can find more multiples of 31 in 930 because 93 is a multiple of 31 so 930 will be too!
(30 x 31 = 930)
(930 ÷ 31 = 30)

That leaves 62 remaining. 62 is a multiple of 31.
2 x 31 = 62 (62 ÷ 31 = 2)

Finally, I can see how many 31s were in 7192.
200 + 30 + 2 = 232
2 Hundreds + 3 Tens + 2 Ones

H T O
2 3 2

31) 7 1 9 2
  − 6 2 0 0 → 6200 ÷ 31 = 200
    9 9 2
  − 9 3 0 → 930 ÷ 31 = 30
      6 2
    − 6 2 → 62 ÷ 31 = 2
        0

THINK: We have 12 boxes of pencils. Each box of 96 pencils costs £15. The pencils are packed into boxes of 5, which are sold at £1.90 per box. If a shop sells all of these boxes what is its profit?

If you have online parent access this lesson is based on Year 6 textbook 6A, chapter 2, lesson 16.

DO:
Part 1: complete the questions below.
Q.1: A shop orders 800 containers of lollies. It tries to distribute all of them equally amongst its 17 sweet shops. How many lollies does each shop get?

Q.2: Amelie has 2,000ml of juice. She fills each ice-lolly mould with 75ml of juice. How many ice lollies can she make and how much juice will be left?
Belle has 2,500ml of juice and she use 95ml of juice for each ice lolly. Will she have more or less juice left than Amelie?

Check your answers before moving onto:
Part 2: Complete the questions below:

Q.1: Manchester Furniture needs to ship 972 sofas across the country. If they can fit 12 sofas in each truck, how many trucks should the company plan to use?

Q.2: A new car park is going have 510 parking spaces. If each row can have 17 parking spaces, how many rows will the car park need?

Q.3: Keith's shelves hold 39 books each. How many shelves will Keith need if Keith has 312 books?
Q.4: Keith has 315 red marbles and 20 blue marbles. Keith has 35 times more red marbles than Joan. How many red marbles does Joan have?

SEE: Look at the videos on the previous two days if you need a reminder of how to multiply and divide using formal methods.

When solving word problems we must:
1. Understand the problem (read it and visualise the problem as you read)
2. Make a plan on how you will tackle the problem – what calculations will you need to do, what will your bar model look like, how many steps will you need to tackle?
3. Solve the calculations needed to reach an answer.
4. Check that your answering sentence or statement makes sense and answers the question.

Don't stop at the calculation point. Word problems require a 'word' answer!

In today's problem:

$12 \times 96 = 1152$ pencils

$12 \times £15 = £180$ (the cost for the boxes of pencils)

$1152 \div 5 = 230$ boxes remainder 2 pencils

$230 \times £1.90 = £437$ (the amount of money gained from selling the boxes of pencils)

$£437 - £180 = £257$ profit

The shop made a profit of £257.

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Q.5: Sally bought 645 crayons that came in packs of 15. How many packs of crayons did Sally buy?

Q.6: There were a total of 143 football games in the season. The season is played for 13 months. How many football games were played each month, if each month has the same number of games?

Q.7: Sam has 215 black balloons. Sam has 43 times more black balloons than Tom. How many black balloons does Tom have?

Q.8: There were a total of 304 rugby games in the season. The season is played for 19 months. How many rugby games were played each month, if each month has the same number of games?

Q.9: There are 31 children in the classroom, each student will get 14 pencils and 41 erasers. How many pencils will the teacher have to give out ?

Q.10: 3,600 seconds in an hour. How many seconds are there in a day?

Deepening:
Times Tables Shifts: https://nrich.maths.org/6863
The numbers in the five times table are:
5, 10, 15, 20, 25 ...
I could shift these numbers up by 3 and they would become:
8, 13, 18, 23, 28 ...
In this activity, the computer chooses a times table and shifts it.
Can you work out the table and the shift each time?
Can you explain *how* you worked out the table and shift each time, and why your method will always work?

ANSWERS – part 1:

Day 1	Day 2	Day 3	Day 4	Day 5
Part 1: Q.1: 512mm³ Q.2: a) 120mm³ b) 1200mm³ Q.3: a) 27mm³ b) 3375mm³	Part 1: Q.1: 9,000cm³ ÷ 420 cm³ = 21.4 21 bottles can be filled. Q.3: The melted cube is: 100cm x 100 x100 = 1,000,000 cm³, The smaller cuboids made from the melted cube are: 20cm x 30 x 10 = 6,000 cm³ 1,000,000 ÷ 6,000 = 166.666667 No, it is not possible to make 167 cubes as the volume is not enough.	Part 1: a) 217 x 14 = 3038 b) 18 x 105 = 1890 c) 1028 x 13 = 13,364 d) 19 x 1116 = 21,204	Part 1: a) 385 ÷ 11 = 35 b) 572 ÷ 52 = 11 c) 288 ÷ 24 = 12 d) 408 ÷ 17 = 24	Part 1: Q.1: Each shop gets 47 lollies. Q2. a) Amelie makes 26 ice lollies. She has 50ml left. b) Bella makes 26 ice lollies but has 30ml left. She has less left than Amelie.

ANSWERS – part 2 and deepening:

Day 1	Day 2	Day 3	Day 4	Day 5

Day 1

Part 2:
Q.1:
a) 216mm³
b) 343mm³
c) 4,608mm³
d) 540mm³

DEEPENING:
Share answers with your teacher.

Day 2

Part 2:
Q.1: 50,000 ÷ 8 = 6250 cubes can be made.
Q.2: 162,000 ÷ 750 = 216 bottles can be filled
Do not do question 3.
Q.4: 15,625 ÷ 2500 = 6 and a quarter buckets are needed.

DEEPENING:
Share answers with your teacher.

Day 3

Part 2:

2054	2089	1344	1125	1344
x 45	x 56	x 87	x 35	x 71
92430	116984	116928	39375	95424

1198	1657	2080	1769	1187
x 56	x 48	x 48	x 97	x 55
67088	79536	99840	171593	65285

1774	2353	2090	1489	1096
x 37	x 51	x 90	x 43	x 25
65638	120003	188100	64027	27400

DEEPENING:

The digits are all 8!

Day 4

Part 2:

47 r 2	62	38	80
16)754	16)992	64)2432	65)5200

96	79 r 31	41	32 r 16
56)5376	68)5403	98)4018	19)624

14 r 21	74 r 20	30 r 18	76
95)1351	69)5126	67)2028	61)4636

DEEPENING:

Sometimes
Possible answers:
32 ÷ 1 = 32 r 0
543 ÷ 2 = 271 r 1
654 ÷ 3 = 218 r 0
765 ÷ 4 = 191 r 1
76 ÷ 5 = 15 r 1
987 ÷ 6 = 164 r 3

Day 5

Part 2:
Q.1: 81 trucks
Q.2: 30 rows
Q.3: 8 shelves
Q.4: 9 red marbles
Q.5: 43 packs
Q.6: 11 games
Q.7: 5 black balloons
Q.8: 16 games
Q.9: 434 pencils
Q.10: 86,400

DEEPENING:

Check some of the answers here:
https://nrich.maths.org/6863/solution