

27/9/23

Multiply and divide by 10, 100, 1000

Year 7 Developing

Exploring concepts of place value and its application to multiplying by powers of ten.

Thousands	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths
1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
	3	4	7	1		
			4	2		
		2	1	4		
4	1	1	1	8		
			6	8	4	
8	0	2	1	0	5	94
		2	8	6	4	7

7. C ✓

8. B ✓

9. D ✓

10. B ✓

11. B ✓

✓ 12.

✓

✓

✓

✓

✓

Bronze:

Q1) $699 \times 100 = 69,900$ ✓

Q2) $713 \times 100 = 71,300$ ✓

Q3) $9770 \div 10 = 977$ ✓

Q4) $878 \times 100 = 87,800$ ✓

Q5) 716 ✓

1. 23×1000

a ✓

b

c

2. $1780 \div 10$

a

b ✓

c

3. $1067 \div 100$

a

b

c

4. $4608 \div 100$

5	7	7	4	1	← =
---	---	---	---	---	-----

8	7	1	2	1	↑
---	---	---	---	---	---

6	6	3	2	0	↑
---	---	---	---	---	---

6. 2.78×100

a ✓

b

c

Extension:

1. Vicky will need to wait for 18 weeks.

2. Barry printed 60 booklets.

3. They should order 300 boxes.

25/9/23

- a) Two hundred and ~~nine~~ ninety three. ✓
- b) Six hundred and eighty two. ✓
- c) Eight thousand, three hundred and two. ✓
- d) Three hundred thousand. ✓

$\frac{4}{4}$

- a) 412 - four hundred and ~~twelve~~ twelve. ✓
- b) 1,056 - One thousand and ~~five~~ fifty six. ✓
- c) 7,426 - Seven thousand four hundred and twenty six. ✓

A

- 1. ~~1~~ four thousand five hundred ~~six~~ and sixty seven point five. ✓
- 2. ~~two~~ ~~thousand~~ thirty four thousand two hundred and eighty nine point four three. ✓
- 3. four hundred and fifty seven thousand three hundred and twenty nine point three four three. ✓
- 4. One million six hundred and fifty seven thousand three ~~hundred~~ hundred and eighty nine point three two two. ✓
- 5. three million two hundred and forty six thousand seven hundred and eighty one point three two one. ✓

B

- 1. 2,034.76 ✓
- 2. 12,209.679 ✓
- 3. ~~100~~ 112,645.95. ✓

Excellent and well laid out.



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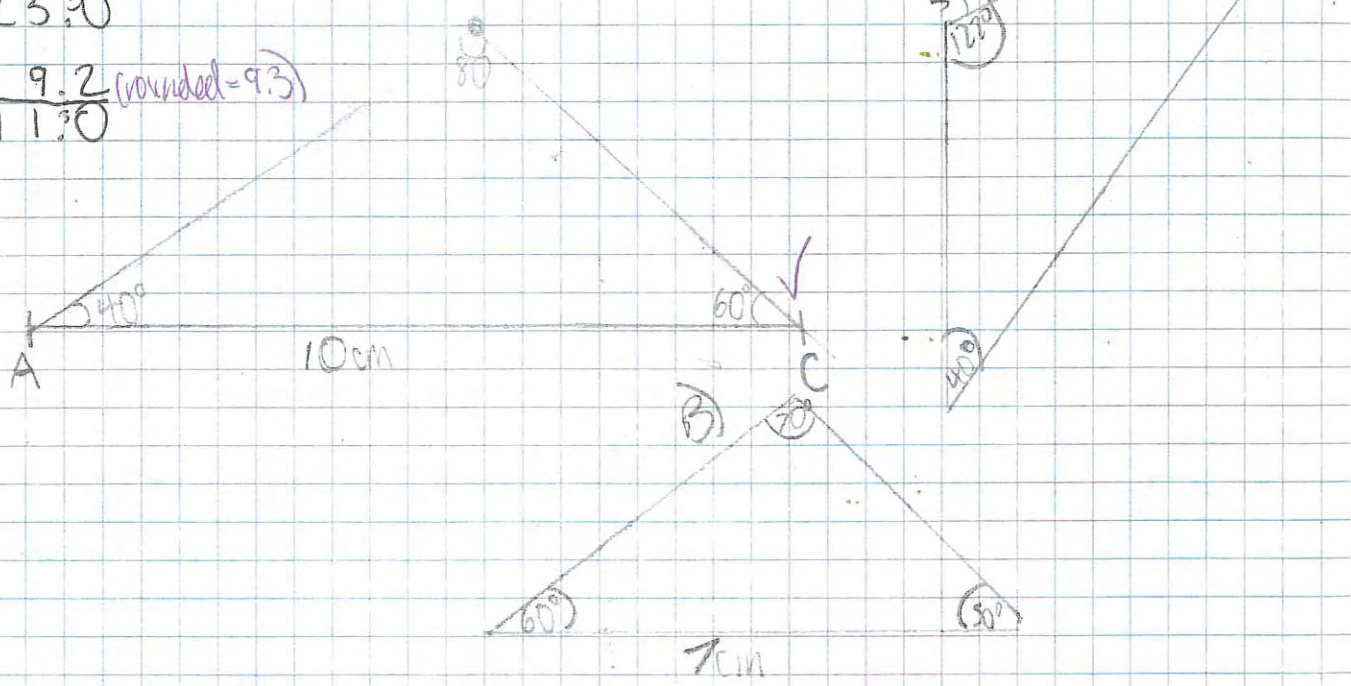
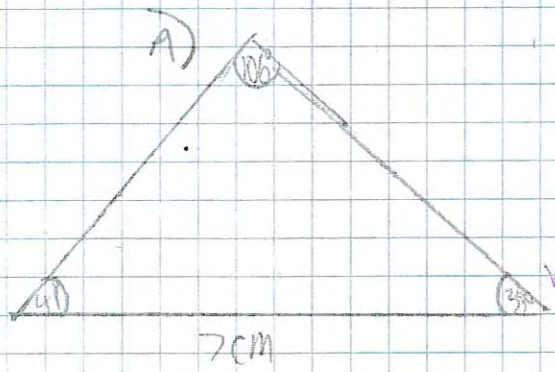
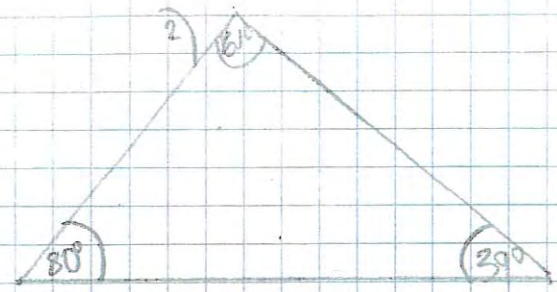


4)
5) Incr.
6) decrease.
7) Increase 45b.

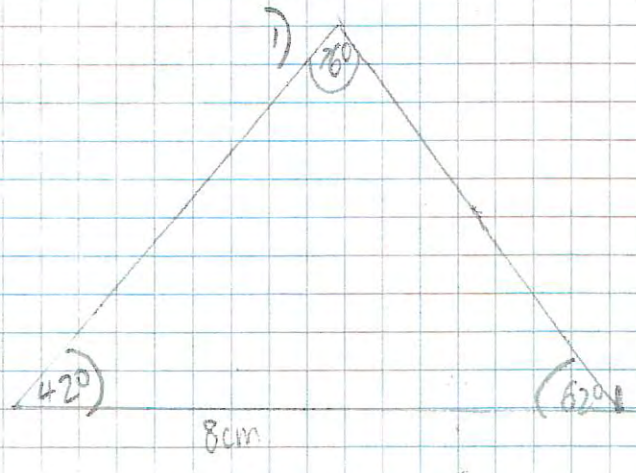
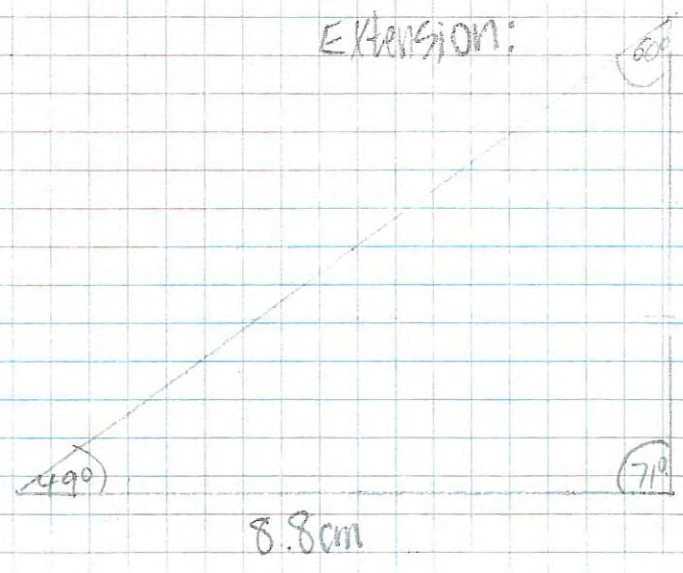
Year 7 Extending Geometry – accurately constructing triangles using a protractor.

Constructing triangles 07/12/23

- 1) $\frac{18.7}{475.0}$ (rounded = 18.8)
- 2) $\frac{3.2}{8126.0}$ (rounded = 3.3)
- 3) $\frac{4.7}{8138.0}$ (rounded = 4.8)
- 4) $\frac{13.3}{31410.0}$ ✓
- 5) $\frac{7.3 \times 9.7}{3129.0}$
- 6) $\frac{8.2}{15123.0}$ ✓
- 7) $\frac{9.2}{12111.0}$ (rounded = 9.3)



EXTENSION:



Finding factors of large numbers using short division.

2 1/1 1/2 3

Division

Calculate

Starter

1. 12 -
- | | | | | | |
|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 6 | 12 |
| 2 | 4 | 6 | 8 | 12 | |
| 3 | 6 | 9 | 12 | | |
| 4 | 8 | 12 | | | |
| 5 | 10 | | | | |
| 6 | 12 | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |

- 1 x 12 = 12
- 2 x 6 = 12
- 3 x 4 = 12
- 4 x 3 = 12
- 6 x 2 = 12
- 12 x 1 = 12

- 4
- 8
- 12
- 16
- 20
- 24
- 28
- 32
- 36
- 40
- 44
- 48
- 52

5.
$$\begin{array}{r} 0136 \\ 12 \overline{) 1632} \end{array}$$

$1632 \div 12 = 136$ ✓

6.
$$\begin{array}{r} 0158 \\ 14 \overline{) 2212} \end{array}$$

$2212 \div 14 = 158$ ✓

7.
$$\begin{array}{r} 0237 \\ 21 \overline{) 4977} \end{array}$$

$4977 \div 21 = 237$ ✓

2. 13 -
- 1
 - 2
 - 3
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10
 - 11
 - 12
 - 13

$1 \times 13 = 13$

- 21
- 42
- 63
- 84
- 77
- 63
- 14

8.
$$\begin{array}{r} 0086 \\ 23 \overline{) 1978} \end{array}$$

$1978 \div 23 = 86$ ✓

Plenary

• So, to find out how many per minute, you need to divide 720 by 15.

3. 14 -
- | | | | |
|----|----|-----|----|
| 1 | 2 | 21 | 42 |
| 2 | 4 | 42 | 48 |
| 3 | 6 | 63 | 60 |
| 4 | 8 | 84 | 72 |
| 5 | 10 | 84 | |
| 6 | 12 | 106 | |
| 7 | 14 | 127 | |
| 8 | | 148 | |
| 9 | | 169 | |
| 10 | | 190 | |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |

- 12
- 24
- 36
- 48
- 60
- 72

$4 + 327$

$$\begin{array}{r} 047 \text{ r5} \\ 15 \overline{) 720} \end{array}$$

• So, to find out how many songs he listened to in a day, you need to divide 1197 by 21.

$14 + 278$

$$\begin{array}{r} 0056 \text{ r10} \\ 21 \overline{) 1197} \end{array}$$

- 13
- 26
- 39

- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40

Excellent ✓

POP!

$$\begin{array}{r} 98 \\ + 14 \\ \hline 112 \\ + \end{array}$$

- 15
- 30
- 45
- 60
- 75
- 90

square, cubes and roots

2/10/23

- ① $2:1, 2 = 2 \checkmark$ ② $4:1, 2, 4 = 4 \checkmark$ ③ $8:1, 2, 4, 8 = 8 \checkmark$
 $4:1, 2, 4$ $12:1, 2, 3, 4, 6, 12 = 12 \checkmark$ $24:1, 2, 3, 4, 6, 8, 12, 24 = 24 \checkmark$
 ④ $18:1, 2, 3, 6, 9, 18 = 18 \checkmark$ $24:1, 2, 3, 4, 6, 8, 12, 24 = 24 \checkmark$

- ① $\sqrt{16} = \sqrt{4} \checkmark$ ② $\sqrt{64} = \sqrt{8} \checkmark$ ③ $\sqrt{8} = 2 \checkmark$ ④ $\sqrt[3]{64} = 4 \checkmark$
 ⑤ $\sqrt[3]{4} = 1.587401052 \checkmark$ ⑥ $\sqrt[3]{27} = 3 \checkmark$ ⑦ $\sqrt[3]{1} = 1 \checkmark$ ⑧ $\sqrt[3]{1} = 1 \checkmark$
 ⑨ $\sqrt[3]{125} = 5 \checkmark$ ⑩ $\sqrt{100} = 10 \checkmark$ ⑪ $\sqrt[3]{343} = 7 \checkmark$ ⑫ $\sqrt{9} = 3 \checkmark$
 ⑬ $\sqrt[3]{729} = 9 \checkmark$ ⑭ $\sqrt{25} = 5 \checkmark$

multiply and divide decimal numbers by the power of 10 3/10/23

When I multiply by 10, 100, 1000 I move it to the left
 when I divide by 10, 100, 1000 I move it to the right

- ① $0.724 \times 10 = 7.24 \checkmark$ ② $1.7 \times 10 = 17 \checkmark$ ③ $12.78 \times 10 = 127.8 \checkmark$
 ④ $15.637 \times 100 = 1563.7 \checkmark$ ⑤ $0.0042 \times 1000 = 4.2 \checkmark$ ⑥ $600 \div 10 = 60 \checkmark$
 ⑦ $0.78 \div 10 = 0.078 \checkmark$ ⑧ $12.65 \div 100 = 0.1265 \checkmark$ ⑨ $84 \div 1000 = 0.084 \checkmark$
 ⑩ $0.07 \div 100 = 0.0007 \checkmark$
 A $6.925 \times 100 = 692.5 \checkmark$ B $50.735 \times 10 = 507.35 \checkmark$
 C $30.224 \div 100 = 0.30224 \checkmark$ D $0.0357 \times 1000 = 35.7 \checkmark$
 E $3.0039 \div 100 = 0.030039 \checkmark$ F $0.039 \div 10 = 0.0039 \checkmark$
 G $0.724 \times 20 = 14.48$ H $1.7 \times 30 = 51$ I $12.78 \times 20 = 255.6$

Handwritten multiplication problems:

$$\begin{array}{r} 724 \\ \times 2 \\ \hline 1448 \end{array}$$

$$\begin{array}{r} 217 \\ \times 3 \\ \hline 511 \end{array}$$

$$\begin{array}{r} 1278 \\ \times 2 \\ \hline 2556 \end{array}$$

adding and subtracting decimals

5/10/23

Year 8 Developing Left page: Exploring properties of number – investigating square numbers and their corresponding square roots. Right page: Multiplying and dividing decimals by powers of 10 and adding decimals.

Starter

Let's Check

1	2	3	4	5	6
Thousands	Hundreds	Tens	Units	Tenths	Hundredths
1) $2.58 \times 10 = 25.8 \checkmark$				5) $36.9 \div 10 = 3.69 \checkmark$	
2) $18.67 \times 100 = 1867 \checkmark$				6) $16.53 \div 100 = 0.1653 \checkmark$	
3) $45.76 \times 1000 = 45760 \checkmark$				7) $7.92 \div 1000 = 0.00792 \checkmark$	
4) $13.32 \times 100 = 1332 \checkmark$				8) $13.24 \div 10 = 1.324 \checkmark$	

Handwritten calculations:

$$\begin{array}{r} 29.726 \\ + 7.854 \\ \hline 21.866 \end{array}$$

green

$$\begin{array}{r} 6.23 \\ + 3.1 \\ \hline 9.33 \end{array}$$

$$\begin{array}{r} 3412 \\ + 341 \\ \hline 6822 \end{array}$$

$$\begin{array}{r} 5.445 \\ + 2.110 \\ \hline 3.335 \end{array}$$

$$\begin{array}{r} 6.230 \\ - 5.128 \\ \hline 1.102 \end{array}$$

⑤ challenge

$$\begin{array}{r} 5.5581 \\ - 2.2500 \\ \hline 3.2081 \end{array}$$

Handwritten calculations and a number pyramid:

$$\begin{array}{r} 14.01 \\ + 6.38 \\ \hline 20.39 \end{array}$$

48.39

13.99 + 14.01 = 28.00

28.00 + 20.39 = 48.39

13.99, 14.01, 6.38, 48.39

54.12

14.36

18.22

54.12 + 18.22 = 72.34

72.34 + 6.14 = 78.48

40.28, 14.36, 6.14, 78.48

11.11 + 22.27 = 33.38

33.38 + 18.28 = 51.66

51.66 + 03.49 = 55.15

55.15 + 1.49 = 56.64

56.64 + 0.30 = 56.94

56.94 + 0.00 = 56.94

Sequences

5 October 2023

Pattern sniffing –
exploring sequences of
numbers by finding a
general formula for the
sequence and using
formulae to determine
sequence terms.

1) $3n + 1$

$3(20) + 1$

$= 61$

2) $3n$

$3(20)$

$= 60$

3) $8n - 4$

$8(20) - 4$

$= 160 - 4$

$= 156$

1) 3, 6, 9, 12, 15, 18, 21

$3n \checkmark$

$3(20)$

$= 60 \checkmark$

2) 14, 21, 28, 35, 42, 49, 56

$7n + 7 \checkmark$

$7(20) + 7$

$= 147$

3) 7, 18, 29, 40, 51, 62, 73

$11n - 4 \checkmark$

$11(20) - 4$

$= 216$

4) 7, 13, 19, 25, 31, 37, 43

$6n + 1 \checkmark$

$6(20) + 1$

$= 121$

5) 10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50

$7n + 3 \checkmark$

$7(20) + 3$

$= 143$

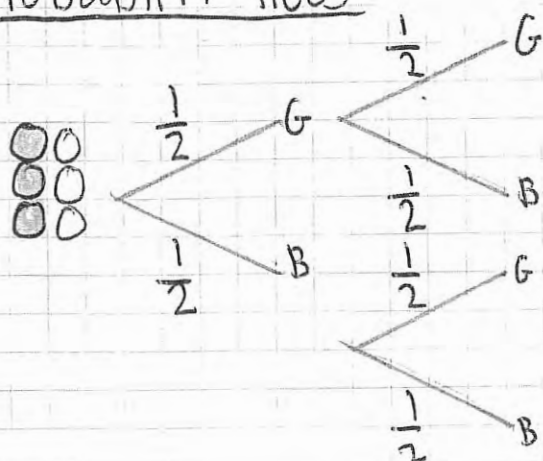
6) 10, 19, 28, 37, 46, 55, 64

$9n + 1 \checkmark$

$9(20) + 1$

$= 181$

probability trees

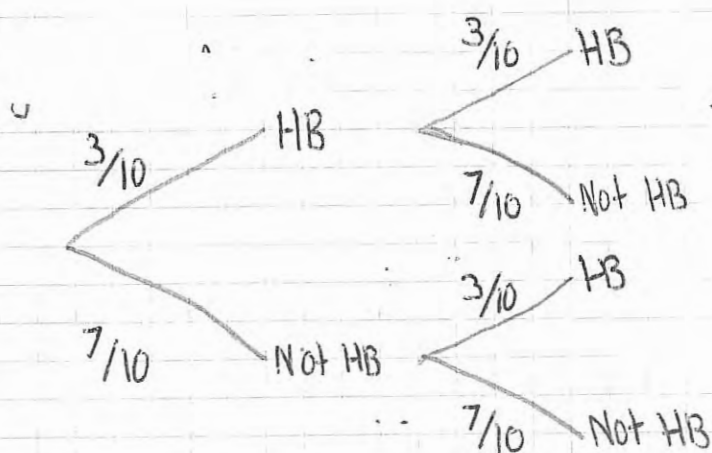


$$P(GG) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$$P(GB) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

$$P(BG) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

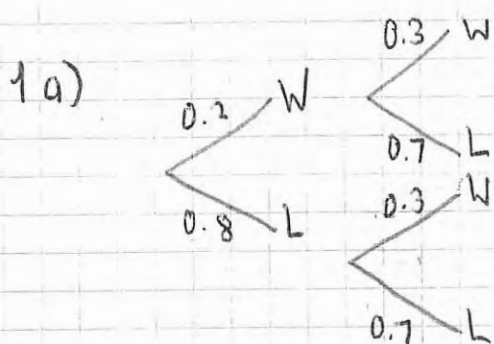
$$P(BB) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$



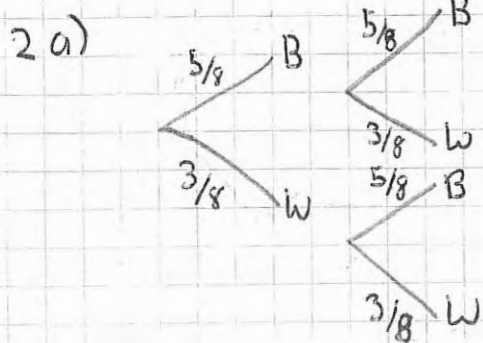
$$P(\text{both HB}) = \frac{3}{10} \times \frac{3}{10} = \frac{9}{100}$$

$$P(\text{one HB}) = \frac{3}{10} \times \frac{7}{10} = \frac{21}{100}$$

$$P(\text{one HB}) = \frac{3}{10} \times \frac{7}{10} = \frac{21}{100}$$



$$P(WW) = 0.2 \times 0.3 = 0.06 \quad \checkmark$$



$$P(BB) = \frac{5}{8} \times \frac{5}{8} = \frac{25}{64} \quad \checkmark$$

$$P(WW) = \frac{3}{8} \times \frac{3}{8} = \frac{9}{64} \quad \checkmark$$

$$\frac{25}{64} + \frac{9}{64} = \frac{34}{64} = \frac{17}{32} \quad \checkmark$$

2a) $5^2 \times 5^4 = 5^6$ 2b) $7^2 \times 7^3 = 7^5$ 2c) $9^8 \div 9^5 = 9^3$

2d) $(5^3)^2 = 5^6$ 2e) $(7^4)^2 = 7^8$ 2f) $8^0 = 8$

2g) $(5^6)^3 = 5^{18}$ 2h) $9^0 = 9$ 2i) $4^6 \div 4^5 = 4^1$

Standard form - calculations

5×10^{-2}

$= 0.05$

3.2×10^{-1}

$= 0.32$

4×10^3

$= 4000$

5×10^2

$= 500$

3.2×10^{-2}

$= 0.032$

4.32×10^3

$= 4320$

4.32×10^5

$= 432000$

MULTIPLYING

$1 \times 10^4 \times 5 \times 10^5$

$= 1 \times 5 \times 10^4 \times 10^5$

$= 5 \times 10^9$

DIVISION

$\frac{5 \times 10^7}{1 \times 10^5} = 5 \times 10^2$

1e) $(7 \times 10^1) \times (5 \times 10^{11})$

$= 7 \times 5 \times 10^1 \times 10^{11}$

$= 35 \times 10^{12}$

$= 3.5 \times 10^{13}$

1f) $9 \times 10^{12} \times 4 \times 10^{-5}$

$= 9 \times 4 \times 10^{12} \times 10^{-5}$

$= 36 \times 10^7$

$= 3.6 \times 10^8$

Factors and highest common factors (HCF)

12.9.23

Starter

- a $24 = 6 \times 4, 3 \times 8$
- b $36 = 6 \times 6$
- c $8 = 2 \times 4$
- d $30 = 6 \times 5$
- e $56 = 7 \times 8$

Year 8 Secure

Exploring properties of number - looking at highest common factors of two numbers

factor pairs of 18, 26, 56, 80

$$\begin{array}{l} 1 \times 18 \\ 2 \times 9 \\ 3 \times 6 \\ 6 \times 3 \\ 9 \times 2 \\ 18 \times 1 \end{array}$$

18

$$\begin{array}{l} 1 \times 26 \\ 2 \times 13 \\ 13 \times 2 \\ 26 \times 1 \end{array}$$

26

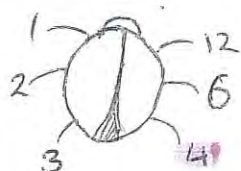
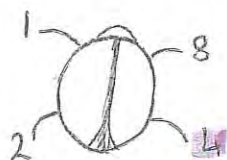
$$\begin{array}{l} 1 \times 56 \\ 2 \times 28 \\ 7 \times 8 \\ 8 \times 7 \\ 14 \times 4 \end{array}$$

56

$$\begin{array}{l} 1 \times 80 \\ 2 \times 40 \\ 4 \times 20 \\ 5 \times 16 \\ 8 \times 10 \end{array}$$

80

Example: find the common factors of 8 and 12



$$\text{HCF} = 4$$

highest common factors Worksheet.

Equations and real life
situations

HCF

a 4 and 14 = 2 ✓

b 6 and 9 = 3 ✓

c 9 and 21 = 3 ✓

d 8 and 12 = 4 ✓

e 6 and 18 = 3 ✓

f 10 and 17 = 1 ✓

g 30 and 45 = 15 ✓

h 40 and 60 = 20 ✓

i 28 and 53 = 7 ✓

highest common factor and lowest common multiple code cracker joke worksheet.

Joke inside reads:

Why was the prawn lonely

LCM

a 4 and 5 = 12 ✓

a 5 and 6 = 30 ✓

b 2 and 7 = 14 ✓

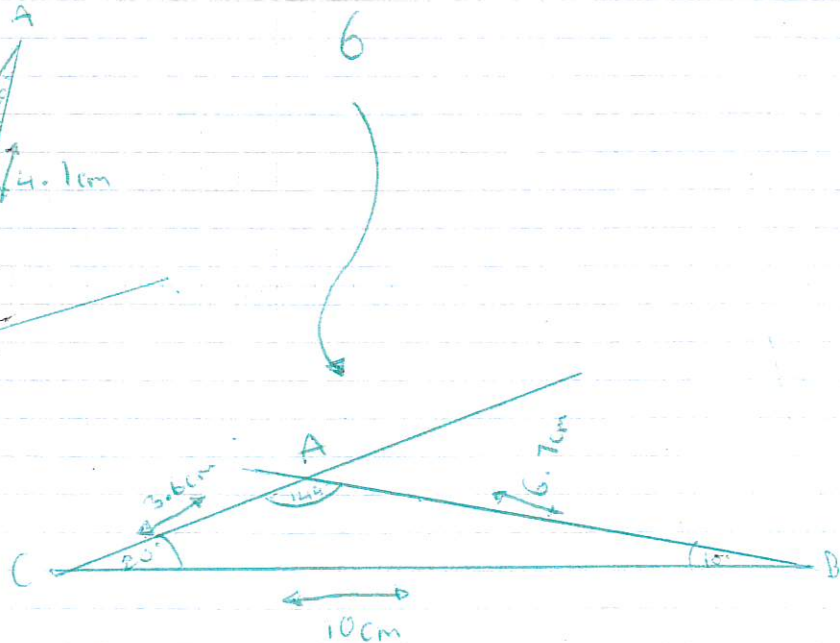
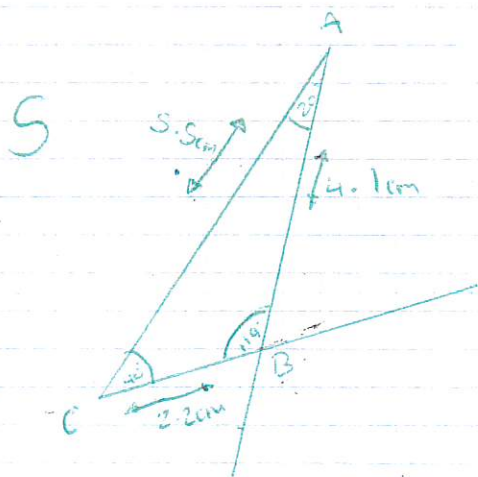
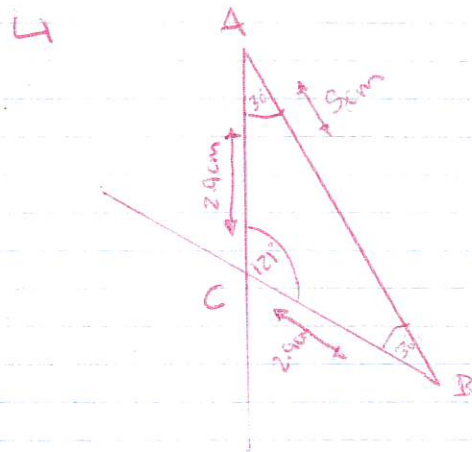
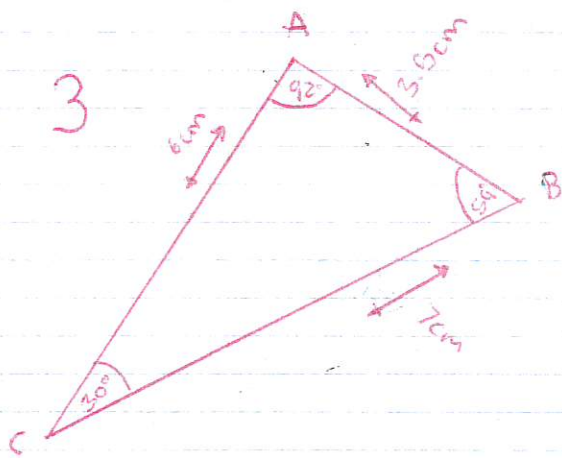
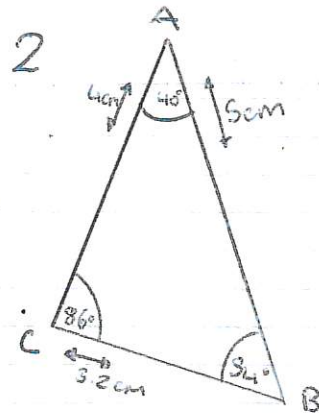
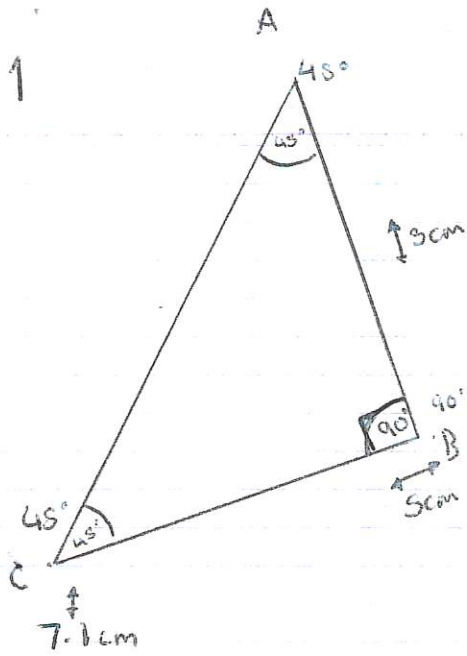
c 3 and 8 = 24 ✓

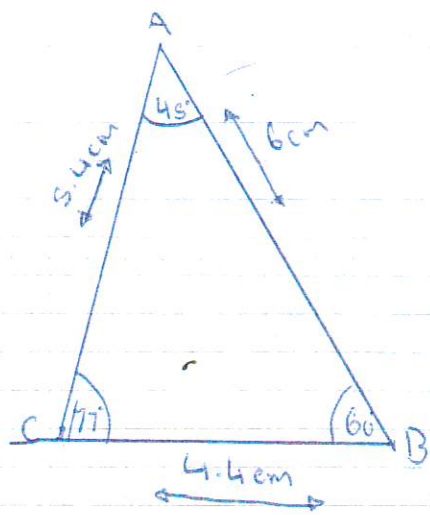
d 4 and 10 = 20 ✓

e 9 and 4 = 36 ✓

m 25 and 35 = 175

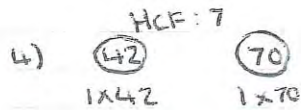
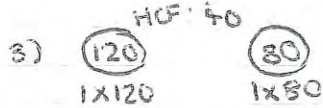
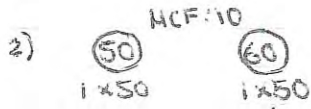
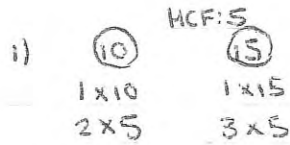
Constructions relay





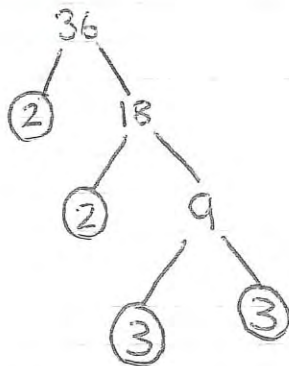
Year 9 Developing Exploring properties of number – breaking down a number into a product of its prime factors.

Prime Factor Trees

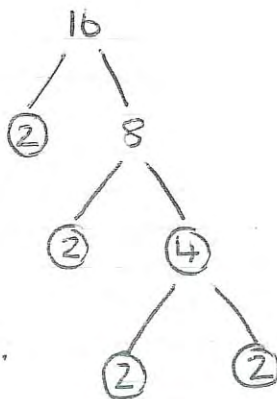


- 2
- 3
- 5
- 7
- 11
- 13

Green:

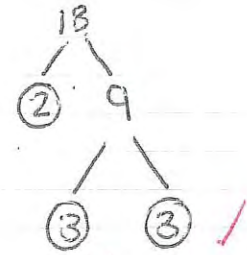


$36 = 2 \times 2 \times 3 \times 3$
 $36 = 2^2 \times 3^2$

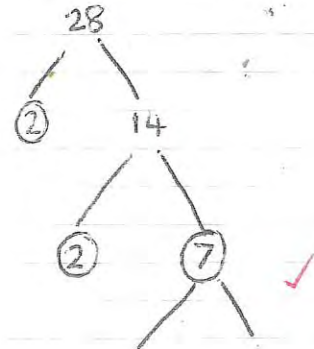


$16 = 2 \times 2 \times 2 \times 2$
 $16 = 2^2 \times 2^2$
 $16 = 2^4$

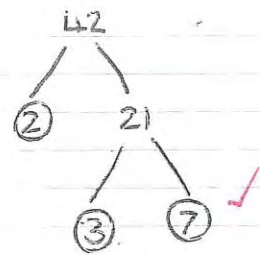
11/09/2023



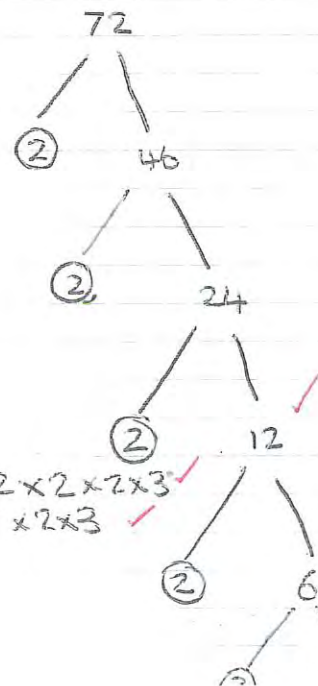
$18 = 2 \times 3 \times 3$
 $18 = 2 \times 3^2$



$28 = 2 \times 2 \times 7$
 $28 = 2^2 \times 7$



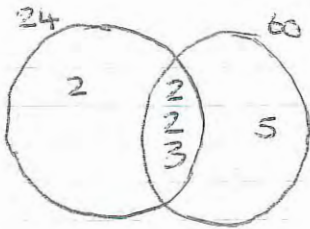
$42 = 2 \times 3 \times 7$



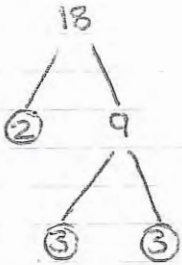
$72 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$
 $72 = 2^3 \times 2^2 \times 2 \times 3$

$$24 = 2 \times 2 \times 2 \times 3$$

$$60 = 2 \times 2 \times 3 \times 5$$

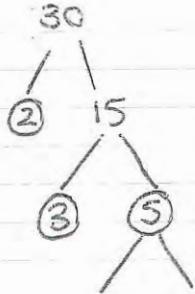


$$\text{HCF} = 2 \times 3 = 6$$

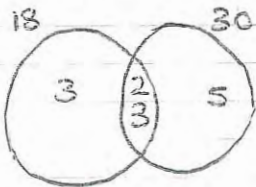


$$18 = 2 \times 3 \times 3$$

$$30 = 2 \times 3 \times 5$$



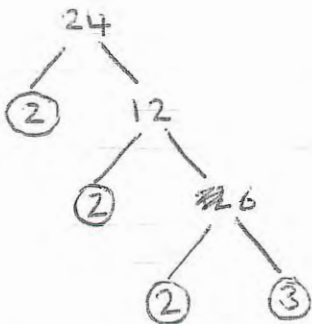
Lovely Venn Diagrams



$$\text{HCF} = 2 \times 3 = 6$$

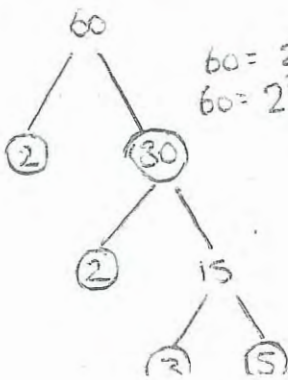
Prime factor tree with HCF and LCM:

12/09/2023



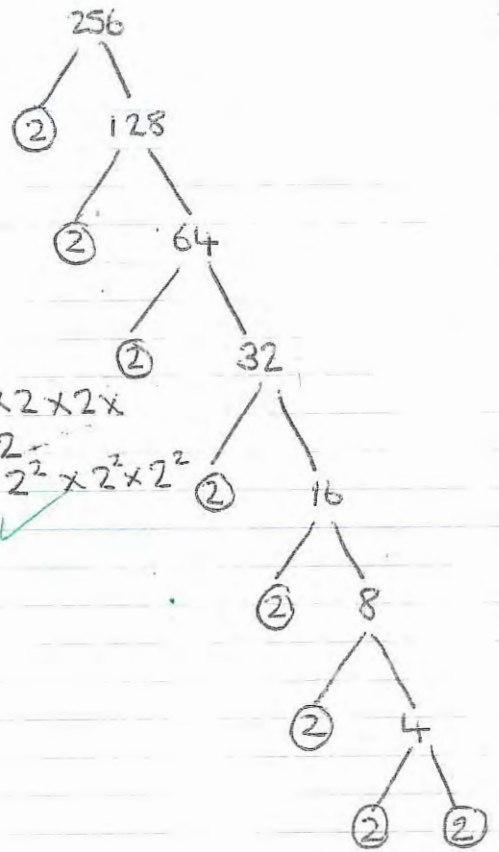
$$24 = 2 \times 2 \times 2 \times 3$$

$$24 = 2^3 \times 2 \times 3$$



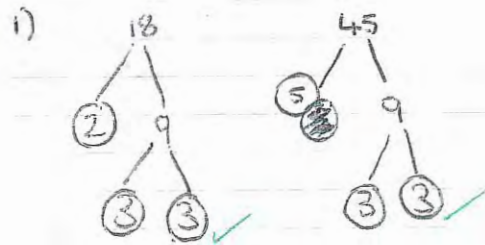
$$60 = 2 \times 2 \times 3 \times 5$$

$$60 = 2^2 \times 3 \times 5$$



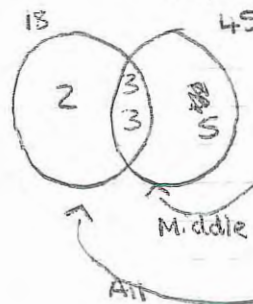
$$256 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

$$256 = 2^8$$



$$18 = 2 \times 3 \times 3$$

$$45 = 3 \times 3 \times 5$$



$$\text{HCF} = 3 \times 3 = 9$$

$$\text{LCM} = 2 \times 3 \times 3 \times 5 = 90$$



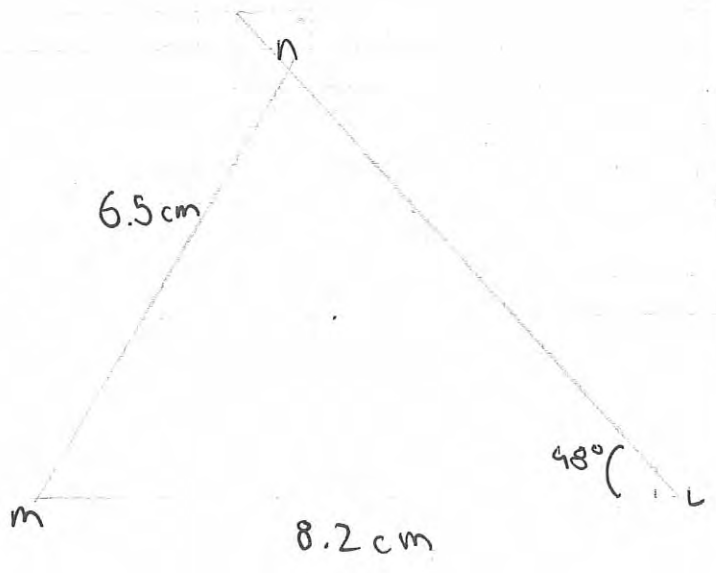
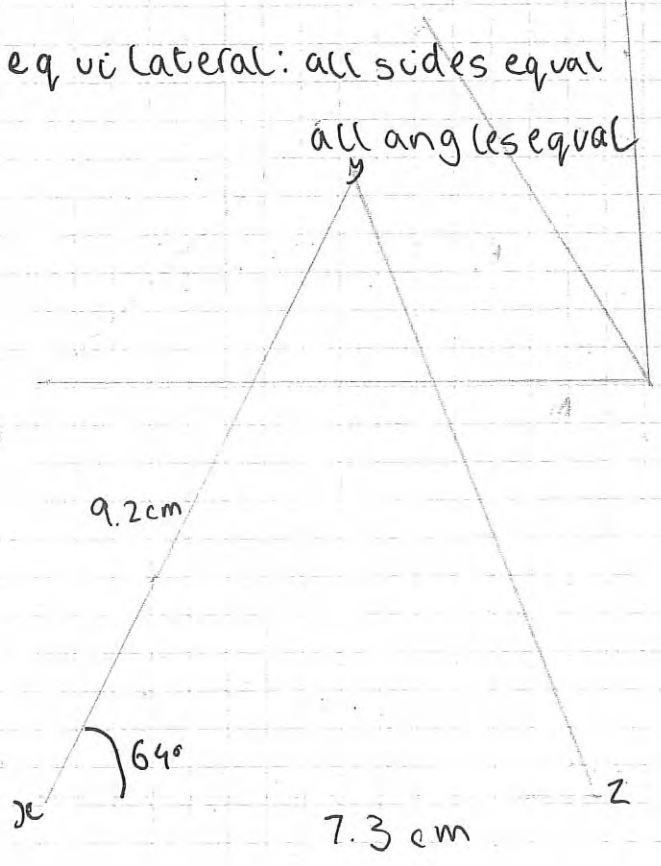
19.10.23

ruler and straight edge constructions

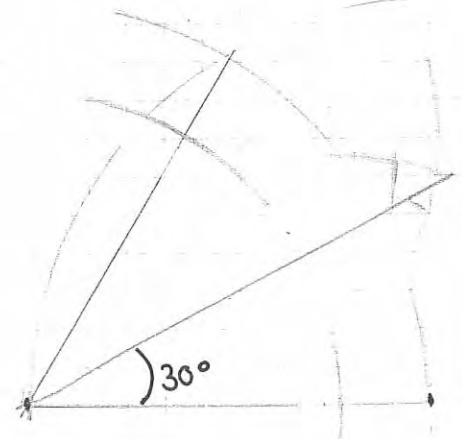
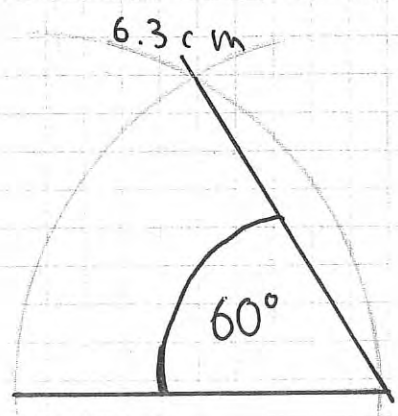
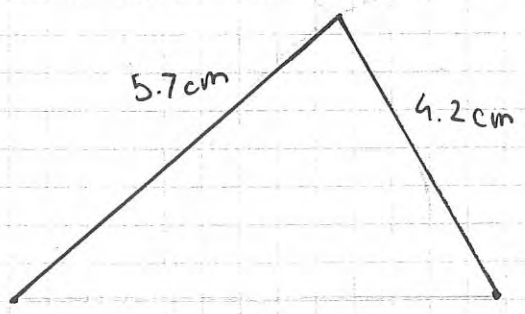
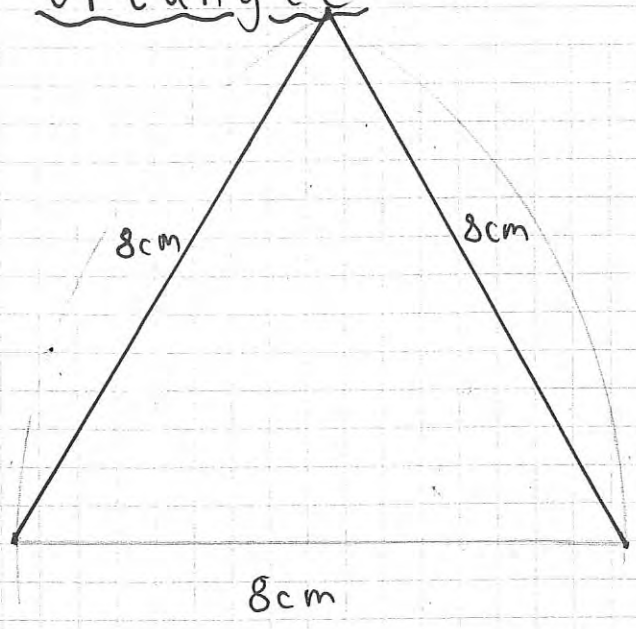
isocel es: 2 equal sides
2 equal angles

scalene: no sides equal

equilateral: all sides equal
all angles equal



equilateral triangle



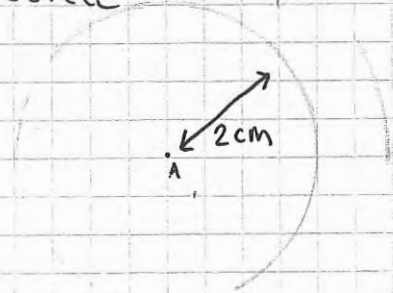
20.10.23

9A

Loci

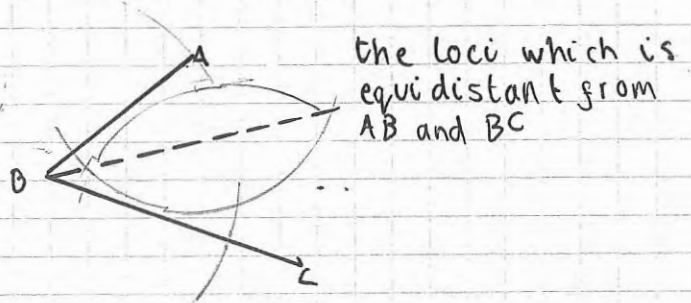
general rules:

★ Loci a fixed distance from a point is a circle
eg.



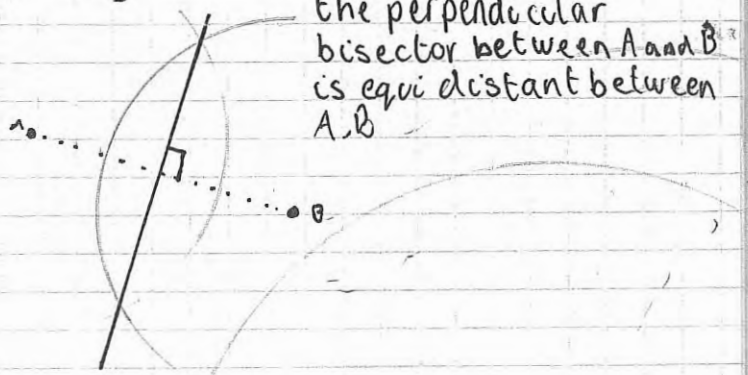
this loci is 2cm away from A

★ Loci which is an equal distance between 2 lines

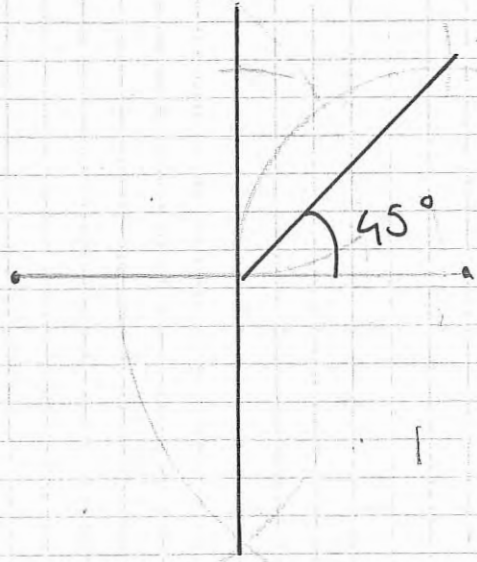
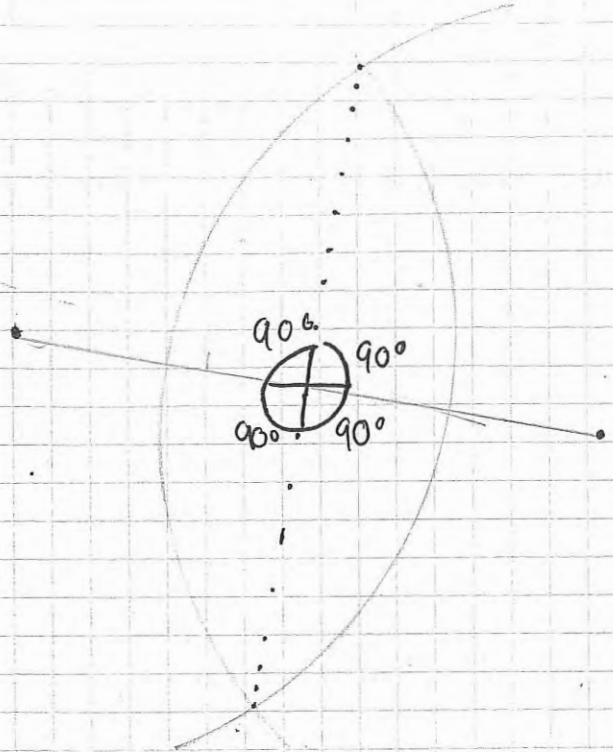


the loci which is equidistant from AB and BC

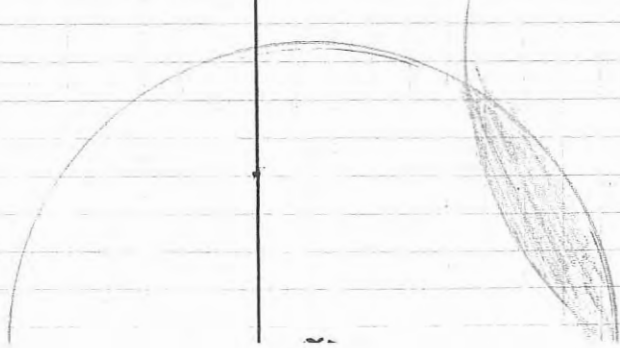
★ the loci of equidistant between 2 points



the perpendicular bisector between A and B is equidistant between A, B



parallelogram



~~AAA~~

Starter

$$6x - 8$$

$$\text{HCF} = 2$$

$$= 2(3x - 4)$$

(Always check)

Key example:

$$(x + a)(x + b)$$

$$= x^2 + (a + b)x + ab$$

$$6x + 9 = 3(2x + 3)$$

$$12x + 16 = 4(3x + 4)$$

$$6x - 15 = 3(2x - 5)$$

Sum	Product	Numbers
8	12	6, 2
16 5	4 -6	6 4, -1
6	8	4, 2
7	-8	-1, 8
-6	8	-4, -2
1	-12	-3, 4
0	-4	-2, -2

② $(5x + 2)(2x + 5)$ $16x + 24$

$$5x \quad 2$$

$$2x \quad 10x \quad 4x$$

$$5 \quad 25x \quad 10$$

$$= 10x^2 + 29x + 10$$

$$= 8(2x + 3)$$

$$15 - 10x$$

$$= 5(3 - 2x)$$

$$24x + 30$$

$$= 6(4x + 5)$$

Well done
Rosie

17/11/23 Factorising

Recap:

① $3x(2x - 1)$
 $= 6x^2 - 3x$

② $(p + 2)(p - 1)$
 $= p^2 + p - 2$

p	p ²	2p
-1	-p	-2

③ $(y - 1)(y + 1)$
 $= y^2 - 1$

y	y ²	-y
+1	y	-1

④ $(2x + 1)(x - 4)$

$$2x^2 - 7x - 4$$

15/11/23 Factorising Quadratics

17/11/23 Quadratics

Expression = $2x + 3$

Formula = $A = \pi r^2$

Identities = $2a + 4b = 2(a + 2b)$

Equations = $2x + 3 = 4$

Starter:

① $x^2 + 3x - 28$
 $= (x + 7)(x - 4)$

② $n^2 - 15n + 56$
 $= (n - 7)(n - 8)$

③

Starter

~~Difference of 2 squares~~

Difference of 2 squares

$$a^2 - b^2 = (a+b)(a-b)$$

Factorising sheet

~~5-3p^4~~

Gamma T19 page 55:

1 a) $2x^2 + 3x = x(2x + 3)$

b) $x^2 - 5x = x(x - 5)$

c) $6x^2 + 9x = 3x(2x + 3)$

d) $3ab - 9ab^2 = 3ab(1 - 3b)$

e) $6x^2y + 2xy = 2xy(3x + 1)$

f) $10uv - 15u^2v^2 = 5uv(2 - 3uv)$

g) $4a^2b - 10a = 2a(2ab - 5)$

h) ~~$4a^2 - 10a$~~
 $7x - 21x^2 = 7x(1 - 3x)$

2

a) $x^2 + 8x + 15 = (x + 3)(x + 5)$

b) $x^2 - 8x + 15 = (x - 3)(x - 5)$

c) $x^2 + 2x - 15 = (x - 3)(x + 5)$

d) $x^2 - 2x - 15 = (x + 3)(x - 5)$

e) $x^2 + 16x + 15$

~~a) $x^2 - 16x + 15 = (x - 1)(x - 15)$~~

b) x

23/11/23 Direct Proportions Starters

1) $x^2 - 7x + 12 = (x - 3)(x - 4)$

2) $x^2 + 3x - 10 = (x + 5)(x - 2)$

$a \propto b$
a is proportional to b

A factory produces 120 shoes per day. In half a day, it will produce 60 shoes.

Example:

x is directly proportional to y.

When $x = 7$, $y = 17.5$

What is x when $y = 2.3$?

~~$x \propto y$~~

$x = ky$

Constant of proportionality

$7 = 17k$

$x = \frac{7}{17}y$

$\frac{7}{17} \times 2.3 = \frac{23}{25}$

23/11/23 More factoring

1) $x^2 - x - 6 = (x + 2)(x - 3)$

2) $x^2 + x - 6 = (x + 3)(x - 2)$

3) $x^2 + 7x + 6 = (x + 6)(x + 1)$

4) $x^2 - 7x + 6 = (x - 6)(x - 1)$

5) $(x - 9)(x + 8)$

6) $x^2 - 25 = (x - 5)(x + 5)$

15, 09, 23

indices:

zero, negatives

- $2^5 = 32$
- $2^4 = 16$
- $2^3 = 8$
- $2^2 = 4$
- $2^1 = 2$
- $2^0 = 1$
- $2^{-1} = \frac{1}{2}$
- $2^{-2} = \frac{1}{2^2}$
- $2^{-3} = \frac{1}{2^3}$
- $2^{-4} = \frac{1}{2^4}$

$a^0 = 1$

$a^{-n} = \frac{1}{a^n}$

key examples

$6^{-2} = \frac{1}{6^2} = \frac{1}{36}$

$7^{-3} = \frac{1}{7^3} = \frac{1}{343}$

$9m^{-4} = \frac{9}{m^4}$

a) $\frac{1}{8^2} = \frac{1}{64}$ ✓

d) $\frac{10}{9^5}$ ✓

b) $\frac{1}{2^4} = \frac{1}{16}$ ✓

e) $\frac{3}{4^3}$ ✓

c) $\frac{1}{12} = \frac{1}{12}$ ✓

f) $\frac{1}{13}$ ✓

19, 09, 23

fractional indices

$\star \frac{12x^{13}}{3x^{-4}} = 4x^{17}$

$\star (a \cdot b^{-2})^{-2} = a^{-2} b^4$

$\star (t^{-4})^2 = t^{-8}$

$\star (3g^5)^3 = 3^3 g^{15}$

$\star \frac{y^7 \times y^{-5}}{y^4} = y^{-2}$

$\star (p^2 q^{-5})^{-1} = p^{-2} q^5$

$a^n \times a^n = a^{2n}$

$\Rightarrow 2n = 1 \Rightarrow n = \frac{1}{2}$

eg:

$25^{1/2} \times 25^{1/2} = 25^1$

$\sqrt{25} \times \sqrt{25} = 25$

so $a^{1/2} = \sqrt{a}$

$a^{1/3} = \sqrt[3]{a}$

$\star 25^{1/2} = 5$

$\star 16^{1/2} = 4$

$\star 100^{1/2} = 10$

$\star 8^{1/3} = 2$

$\star 27^{1/3} = 3$

$\star (\frac{4}{9})^{1/2} = \frac{2}{3}$

$$\star \left(\frac{125}{8}\right)^{1/3} = \left(\frac{5}{2}\right)$$

$$\star \left(\frac{16}{10000}\right) = \frac{2}{100} = \frac{1}{50}$$

Key example

$$\star 8^{2/3} = 8^{1/3 \times 2} = (8^{1/3})^2 = \sqrt[3]{8^2} = 4$$

$$25^{3/2} = 25^{1/2 \times 3} = (25^{1/2})^3 = 5^3$$

not needed
workings out

$$8^{4/3} = (8^{1/3})^4 = 2^4 = 16$$

$$\star 27^{2/3} = (27^{1/3})^2 = 3^2 = 9$$

$$\star 1000^{2/3} = (1000^{1/3})^2 = 10^2 = 100$$

$$\star 4^{3/2} = (4^{1/2})^3 = 2^3 = 8$$

$$\star 16^{3/2} = (16^{1/2})^3 = 4^3 = 64$$

$$\star 16^{3/4} = (16^{1/4})^3 = 2^3 = 8$$

$$\star 4^{2.5} = 4^{5/2} = (4^{1/2})^5 = 2^5 = 32$$

$$\star 16^{-1/2} = (16^{1/2})^{-1} = (4)^{-1} = \frac{1}{4}$$

Fantastic class work.

Always mark

21, 09, 23

9A

Fractional indices

$$a) \frac{(2x^{-2})^3 \times (2x^3)^2}{6^2 \times x^{-4}}$$

1) 9

2) 16

3) 125

4) $3^2 \times 3 = 9^3 \times 3^3$

5) $4^5 \times 2^3 = 4^8 \times 2^8$

6) $4^2 \times 4^3 \times 4 = 64 \times 4^6$ ✓

7) $4^2 \times 4^3 \div 4 = 4^4$

$$x^y \times x^z = x^{y+z}$$

$$\frac{x^y}{x^z} = x^{y-z}$$

$$4^5 \div 4^2 \times 4 = \frac{4^5}{4^2} \times 4 = \frac{4^6}{4^3} = 4^3$$

$$(x^3)^2 = (x \times x \times x) \times (x \times x \times x) = x^6$$

$$2^{3/2} \times 2^{1/2} = 2^{4/2} = 2^2$$

$$\rightarrow 2 \times 2$$

$$\rightarrow 2 \times \sqrt{2} \sqrt{2}$$

$$\rightarrow \sqrt{2} \sqrt{2} \times \sqrt{2} \sqrt{2}$$

$$\rightarrow 2^{3/2} = \sqrt{2} \sqrt{2} \sqrt{2} = (\sqrt{2})^3 = (2^{1/2})^3$$

29/11/23

Inverse proportion

1. $B \propto P$ 4 box = 192 pins ✓

$(192 \div 4 = 1 \text{ box}) \times 5$

2. $B \propto C$ 15 beads = 5.25, 20 beads? ✓

$(5.25 \div 15) \times 20$

3. $B \propto W$ 20 blocks = 44kg ✓

$(44 \div 20) \times 12$

4. $m \propto B$ 2:20 = 76, 10? ✓

$(2:20 \div 7) \times 10$

5. $R \propto C$ 15m = 2:20, 12? ✓

$(15 \div 2:20) \times 12$

Key Note: Speed = K/T

Question:

4 bricks = 10 days
5 bricks? = 12.5 days
[1 brick = $(10/4)$] $\times 5 = 12.5$

Example Answer:

$B:D$ (4-1) = 4:4)

4:10
11:8)*

inverse relationship, we opposite on sides,
side is divided, so other side multiply $\times \frac{4:10}{1:20} = 5:8$) = 1:20

Question:

1. $T_a: T_i$

11:3
 $\div 6 (6:5.5) \times \frac{11}{6}$ ✓

2. $m: \text{hour}: \text{hour}$

3:4:6
~~bring in 2~~
6:2:6
5: $\frac{2}{6}$: 1
x
8 ✓

3. E 174:14
203:12) = 7/6 ✓

5. 25 : 12 bottles
 20 : 15 bottles
 $(12 \div 15) = 12/15 \times 25$

6. C : P
 33 : 32
~~22~~ : 22
 $32 \div 22 = \left(\frac{32}{22}\right) \times 33 = 48$

Inverse $1 = (32 \div 33) \times 22 = 21.3$ so 22 classrooms

7. 6 men : 25 hours : 5 shoes
 $\frac{6}{10}$ (10 men : 15 hours : 5 shoes)
 $\frac{6}{10} \times 25 =$

8. $100 \uparrow 25\% = 125$

S : T
 $25\% \uparrow$ $20\% \downarrow$
~~125~~ $100 = 50s$
 $\frac{100}{125} (125 = 40)$

$50 - 40 =$
 20% decrease
 (Yes!)

Key Example!

y is inversely proportional to x

when x is 5, y is 3 (Find y, if x = 8)

$y \propto \frac{1}{x}$ ($\frac{1}{x}$ to represent inverse)

$y = \frac{k}{x}$ use x = 5, y = 3 to find k

$(3) = \frac{k}{(5)} \therefore k = 5 \times 3 = 15$

$y = \frac{15}{x} \quad y = \frac{15}{8}$

Key Example:

y is inversely proportional to x^2

when x is 4, y is 5 (find y, if x = 6)

$y \propto \frac{1}{x^2}$

$y = \frac{k}{x^2}$ use x = 4, y = 5 to find k

$5 = \frac{k}{4^2} \rightarrow 5 \times 16 = k = 80$

$5 = \frac{80}{x^2} \quad y = \frac{80}{6^2} = \frac{80}{36}$

Questions:

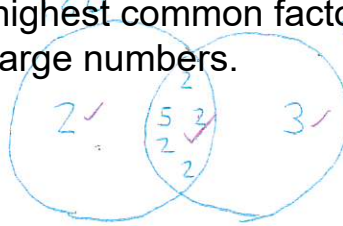
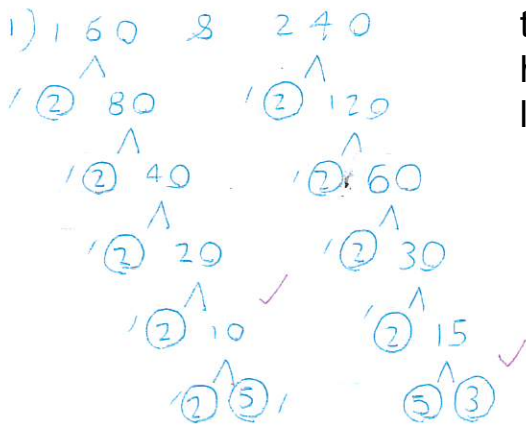
1. $y \propto \frac{1}{x}$ when x = 8, y = 2, x = 2, y = ... = 16

REVISION

Year 9 Secure

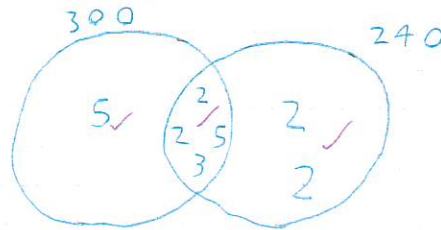
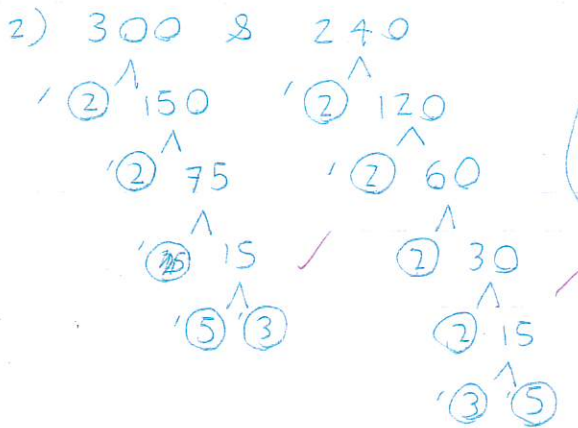
16/10/23

Exploring properties of number – breaking down a number into a product of its prime factors and then using this information along with Venn diagrams to find the highest common factor and lowest common multiple of 2 large numbers.



HCF = $2 \times 2 \times 2 \times 2 \times 5 = 80$

LCM = $80 \times 2 \times 3 = 480$



HCF = $2 \times 2 \times 3 \times 5 = 60$

LCM = $60 \times 5 \times 2 \times 2 = 1200$

3) 6.7037 ; (1dp) = 6.7 ✓
 (2dp) = 6.70 ✓
 (3dp) = 6.704 ✓

4) 44950

1 SF	2 SF
40000 ✓	45000 ✓
0.0004 ✓	0.0037 ✓

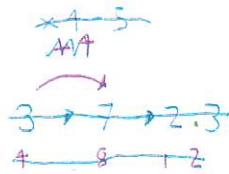
5) 0.003715

Question 5: B

Rule: $\times 4 \rightarrow -5$

a) 2nd term = 7

b) 3rd term = 23



~~4n - 5~~

Question 6:

Rule: $+7 \times 2$

$26 \div 2 = 13$

$26 + 7 = 33$

$13 - 7 = 6$

$33 \times 2 = 66$

a) 1st term = 6

$6 \rightarrow 26 \rightarrow 66$

b) 3rd term = 66

- 1) $-7, -4, -1, 2, 5$
 2) $100, 92, 86, 72, 66$
 3) $3, 6, 12, 24, 48$
 4) $0, 0.4, 4, 40, 400$
 5) $1.3, 0.7, 0.1, -0.5, -1.1$
 6) $200, 100, 50, 25, 12.5$

Q1) $3n + 4$ $3 + 4 = 7$
 $7, 10, 13, 16, 19$

Q2) $5n - 2$ $5 - 2 = 3$
 $3, 8, 13, 17, 22$
 $\times 18$ $\times 23$

BIDMAS (no calculator)

Q1) $2^2 + (4 - 3) \times 5 = 20 \times 9$ Q2) $(\sqrt[3]{64} - \sqrt{4})^2 = 4 \times 16$

$4 - 3 = 1$ $2^2 = 4$
 $1 \times 5 = 5$
 $2^2 = 4$ $4 + 1 \times 5$
 $4 \times 5 = 20$

$\sqrt[3]{64} = 4$ $(4 \times 4 \times 4 = 64)$
 $(4 \times 4 \times 4 = 64)$
 $\sqrt{4} = 2$

$4 - 2 = 2$ $2^2 = 4 \times 16$ $4 - 2 = 2$ $2^2 = 4$

Q3) $(36 + 4 \times 7) - (14 - 3 \times 4)^2 = 16$ Q4) $\frac{\sqrt[3]{27} + 6}{3} = 3$

$(4 \times 7 = 28)$
 $36 + 28 = 64$

$(14 - 12 = 2)$ $64 \div 4 = 16$ ✓
 $2^2 = 4$

$\sqrt[3]{27} = 3$ $3 + 6 = 9$

$\frac{9}{3} = 9 \div 3 = 3$ ✓

SILVER

Q1) $1, 5, 9, 13$ $4n - 3$ ✓
 -3 $(4, 8, 12, 16)$

Q3) $2, 10, 18, 26$ $8n - 6$ ✓
 -6 $(8, 16, 24, 32)$

Q2) $2, 5, 8, 11$ $3n - 1$ ✓
 -1 $(3, 6, 9, 12)$

Q4) $8, 15, 22, 29$ $7n + 1$ ✓
 $+1$ $(7, 14, 21, 28)$

GOLD

Q1) 39th term: 308 ✓

$4, 12, 20, 28$ $8n - 4$
 -4 $(8, 16, 24, 32)$

39
 $\times 8$
 $\hline 312$
 -4
 $\hline 308$