Section 1 (No Calculator)

July 26, 2020 10:13 AM

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Question 1

What is $17.86 \div 0.19$?

- A ○ 940 ✗
- B ○ 814 ✗
- C ● 94 ✓
- D ○ 81.4

$a \cdot 1 = a$

Step 1 - Stuff We Need to Know

- ✓ Long division with decimals | Arithmetic operations | 5th grade | Khan Academy
- ✓ Multiplying: 2 digits times 1 digit | Multiplication and division | Arithmetic | Khan Academy
- ✓ Multiplying: 2 digit numbers | Multiplication and division | 4th grade | Khan Academy

Step 2 - Duddhawork

① $\frac{17.86}{0.19} \cdot \boxed{\frac{100}{100}} = \frac{1786}{19}$ (one)

$$\begin{array}{r} 0094 \\ 19\overline{)1786} \\ -\ 171 \\ \hline 0076 \\ 76 \\ \hline 0 \end{array}$$

Remainder

$\therefore$ $\boxed{94 \cdot 19 = 1786 \quad \frac{17.86}{0.19} = \frac{1786}{19} = 94}$

$19 \cdot 10 = 190$

$$\begin{array}{r} 19 \\ \times 9 \\ \hline 81 \\ +\ 90 \\ \hline 171 \end{array}$$

$20 \cdot 4 = 80$

$$\begin{array}{r} 19 \\ \times 4 \\ \hline 36 \\ +\ 40 \\ \hline 76 \end{array}$$

Step 3 - Building Intuition

$\frac{17.86}{0.19}$

How many times does 0.19 fit in 17.86?

$0.19 \approx 0.20 = \frac{1}{5} =$ ① ② ③ ④ ⑤ 1 unit.

$\approx$ 18 units with 5 fifth each,

$$\begin{array}{r} 18 \\ \times 5 \\ \hline 40 \\ +\ 50 \\ \hline 90 \end{array}$$

fit $\approx$ 90 times

Question 2

What is the sum of the following set of four numbers?

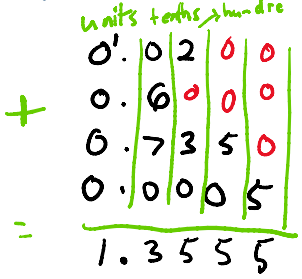
$$0.02, 0.6, 0.735, 0.0005$$

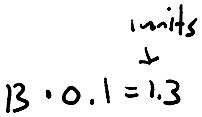
- A ○ 1.135
- B ● 1.3555
- C ○ 0.13555
- D ○ 0.0748

Step 1 - Stuff We Need to Know

- ✓ Adding: why carrying works | Addition and subtraction | Arithmetic | Khan Academy
- ✓ Adding multi digit numbers with regrouping
- ✓ Adding decimals: example 1 | Decimals | Pre-Algebra | Khan Academy
- ✓ Adding decimals: example 3 | Decimals | Pre-Algebra | Khan Academy

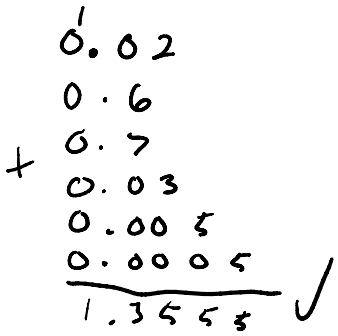
Step 2 - Duddhawork





Step 3 - Building Intuition

0.7 + 0.03 + 0.005 = 0.735



Question 3

What is the value of
$7.05 + 5 + 1.5 + 2.05 + 4.5$?

- A ○ 9.75
- B ○ 15.6
- C ○ 19.1
- D ● 20.1

Step 1 - Stuff We Need to Know

- ✓ Adding: why carrying works | Addition and subtraction | Arithmetic | Khan Academy
- ✓ Adding multi digit numbers with regrouping
- ✓ Adding decimals: example 1 | Decimals | Pre-Algebra | Khan Academy
- ✓ Adding decimals: example 3 | Decimals | Pre-Algebra | Khan Academy

Step 2 - Duddhawork

tens units tenths hundreths

$$\begin{array}{r} 2\ 7.05 \\ 5.00 \\ +\ 1.50 \\ 2.05 \\ 4.50 \\ \hline 20.10 \end{array}$$

$11 \cdot 0.1$

$11 \cdot \frac{1}{10}$

$\frac{11}{10} = 1.1$

$0.05 = \frac{5}{100} = \frac{1}{20} = 5\%$

Step 3 - Building Intuition

$7.05 \quad 7 + 0.05 \quad 7\frac{1}{20} \Rightarrow \frac{141}{20}$

$5 \quad 5 + 0 \quad 5 \Rightarrow 100_{20}$

$1.5 \Rightarrow 1 + 0.5 \Rightarrow 1\frac{1}{2} \Rightarrow 3/2 \cdot \frac{10}{10}$

$2.05 \quad 2 + 0.05 \quad 2\frac{1}{20} \Rightarrow 4\frac{1}{20}$

$4.5 \quad 4 + 0.5 \quad 4\frac{1}{2} \Rightarrow 9/2 \cdot \frac{10}{10}$

$\frac{141}{20} + \frac{100}{20} + \frac{30}{20} + \frac{41}{20} + \frac{90}{20} = \frac{402}{20} = \frac{400}{20} + \frac{2}{20}$

$= 20 + \frac{1}{10} = 20.1$

Question 4

What number is represented by this expanded form?

$(3 \times 1\,000\,000) + (2 \times 10\,000) + (7 \times 1000) + (9 \times 100) + (6 \times 10) + (8 \times 1)$

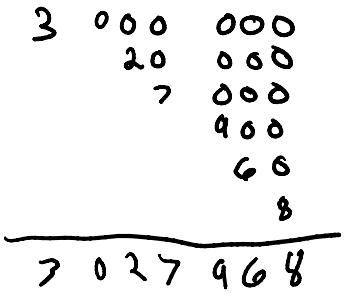
- A ○ 327 968
- B ● 3 027 968
- C ○ 3 207 968
- D ○ 3 270 968

Step 1 - Stuff We Need to Know

- ✓ Addition with regrouping | Addition and subtraction within 100 | Early Math | Khan Academy
- ✓ Adding: why carrying works | Addition and subtraction | Arithmetic | Khan Academy
- ✓ Adding multi digit numbers with regrouping

Step 2 - Duddhawork

Method 1

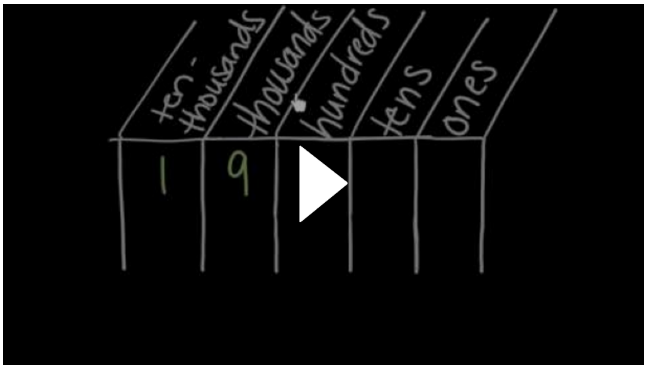


Method 2

Eliminate the multiple choice starting with the millions.

Step 3 - Building Intuition

Adding whole numbers by their place values | Math | 4th grade | Khan Academy



Question 5

What is the value of $17 - 2 \times 3 + 9$?

- A ○ 2
- B ● 20
- C ○ 54
- D ○ 180

Step 1 - Stuff We Need to Know

- ✓ Introduction to order of operations | Arithmetic properties | Pre-Algebra | Khan Academy
- ✓ What order to do operations in
- ✓ BEDMAS
  - B rackets
  - E xponents
  - DM Div / Mult
  - AS Add / Sub.

$\square^2$

L → R

$4 - 2 = 4 + (-2) = 4 - 2 = 2$

Step 2 - Duddhawork

subtraction

$17 - 2 \times 3 + 9$

① $= 17 - (6) + 9$

$= 11 + 9$

$= 20$

$17 + (-2 \times 3) + 9$

② $= 17 + (-6) + 9$ (negative)

$= 11 + 9$

$= 20$

Step 3 - Building Intuition

$8 \times 2 + (4^2 - 2) \div 7$

$= 8 \times 2 + (16 - 2) \div 7$

$= 8 \times 2 + (14) \div 7$

$= 16 + 14 \div 7$

$= 16 + 2$

$= 18$

Section 2 (With Calculator)

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Question 1

Liam has $1370 in his bank account.
From this account, he spends $123 on groceries, $55 on a textbook and $800 on rent.
Liam deposits a cheque for $260 into the same account.

What is the balance in Liam's bank account after these transactions?

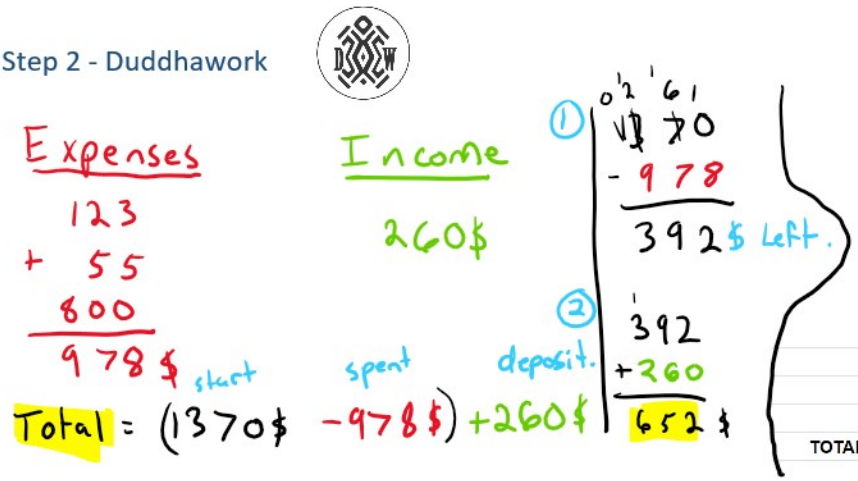
- A $652
- B $718
- C $1238
- D $2088

Step 1 - Stuff We Need to Know

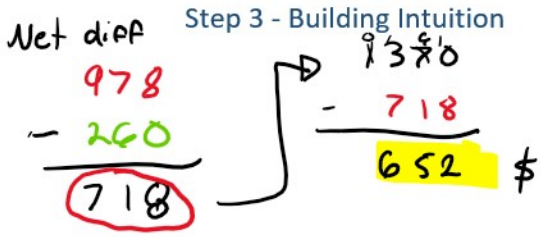
- ✓ Adding: why carrying works | Addition and subtraction | Arithmetic | Khan Academy
- ✓ Adding multi digit numbers with regrouping

$$\begin{array}{r} 21 \\ +\ 17 \\ \hline 38 \end{array}$$

Step 2 - Duddhawork



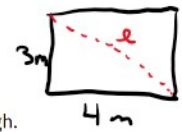
Step 3 - Building Intuition



Spreadsheet Link

	Expenses	Deposits	Starting Balance	Final Balance
	123	260	1370	652
	55			
	800			
TOTAL	978	260		

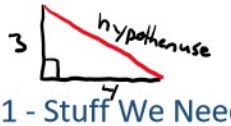
Question 2

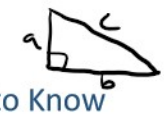


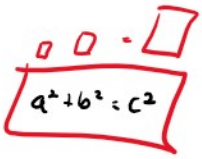
A rectangular window measures 4 m wide and 3 m high.

What is the length of the window's diagonal?

- A ○ 25 m
- B ○ 12 m
- C ○ 7 m
- D ● 5 m

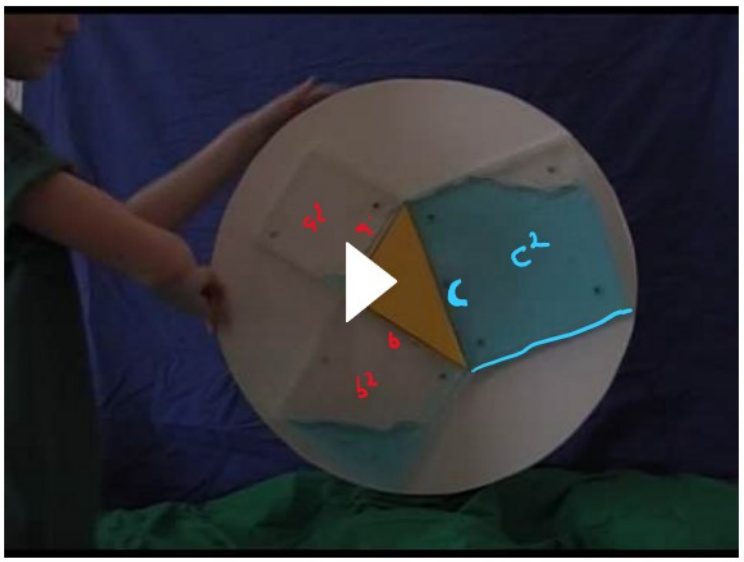






Step 1 - Stuff We Need to Know

- ✓ The Pythagorean theorem intro | Right triangles and trigonometry | Geometry | Khan Academy
- ✓ Pythagorean theorem 2 | Right triangles and trigonometry | Geometry | Khan Academy
- ✓ Pythagorean theorem 3 | Right triangles and trigonometry | Geometry | Khan Academy
- ✓ Pythagorean theorem water demo



Step 2 - Duddhawork

$a^2 + b^2 = c^2$

$3^2 + 4^2 = c^2$

$9 + 16 = c^2$

$c^2 = 25$

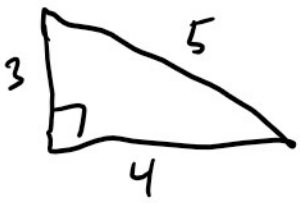
$c = \pm\sqrt{25}$

$c = 5$

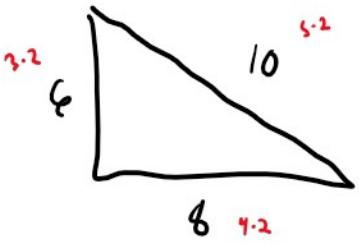
$5 \cdot 5 = 25$

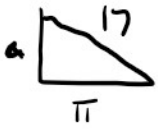
$\therefore \sqrt{25} = 5$

Step 3 - Building Intuition



$36 + 64 = 100$ ✓





what is a?

Question 3

Which equation below has $x = 12$ as a solution?

- A ○ $3(x - 17) = 19$
- B ○ $8x + 4 = 12$
- C ○ $\frac{2}{3}x + 3 = -5$
- D ● $\frac{7}{3}x - 6 = 22$ ✓

Step 1 - Stuff We Need to Know

- ✓ What order to do operations in
- ✓ BEDMAS
- ✓ What is a variable? | Introduction to algebra | Algebra I | Khan Academy
- ✓ Solving equations with the distributive property | Linear equations | Algebra I | Algebra I | Khan Academy

Step 2 - Duddhawork

Substitution sub $x = 12$

(A) $3(12 - 17) \stackrel{?}{=} 19 \Rightarrow 3(-5) \stackrel{?}{=} 19 \Rightarrow -15 \neq 19$ ✗

(B) $8(12) + 4 \stackrel{?}{=} 12 \Rightarrow 96 + 4 \stackrel{?}{=} 12 \Rightarrow 100 \neq 12$ ✗

(C) $\frac{2}{3}(12) + 3 \stackrel{?}{=} -5 \Rightarrow 8 + 3 \stackrel{?}{=} -5 \Rightarrow 11 \neq -5$ ✗

(D) $\frac{7}{3}(12) - 6 \stackrel{?}{=} 22 \Rightarrow 28 - 6 \stackrel{?}{=} 22 \Rightarrow 22 = 22$ ✓

Step 3 - Building Intuition

Try to solve for x in all 4 equations:

(A) $3(x - 17) = 19$

$3x - 51 = 19$ (+51 +51)

$3x = 70$

$\frac{3x}{3} = \frac{70}{3}$

$x = \frac{70}{3} \neq 12$

(B) & (C) exercise ↓ $x \neq 12$

(D) $\frac{7}{3}x - 6 = 22$ (+6 +6)

$\frac{7}{3}x = 28$ (· 3 · 3)

$7x = 84$

$x = \frac{84}{7} = 12$ ✓

84/7=12

Question 4

Which list of 4 fractions is in order from least to greatest?

A ○ $\frac{3}{7}, \frac{3}{14}, \frac{3}{10}, \frac{3}{20}$

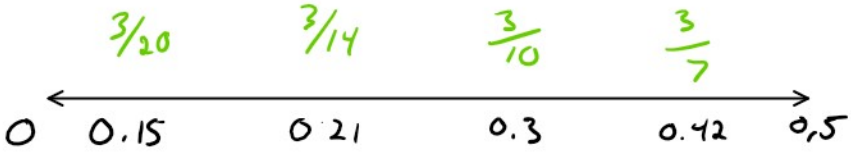
B ○ $\frac{3}{14}, \frac{3}{7}, \frac{3}{10}, \frac{3}{20}$

C ● $\frac{3}{20}, \frac{3}{14}, \frac{3}{10}, \frac{3}{7}$

D ○ $\frac{3}{7}, \frac{3}{10}, \frac{3}{14}, \frac{3}{20}$

Step 1 - Stuff We Need to Know

- ✓ Fraction to decimal | Decimals | Pre-Algebra | Khan Academy
- ✓ Comparing Rational Numbers | 7th grade | Khan Academy



Step 2 - Duddhawork

Fractions → decimals

0.4285...
7 | 3.0000
-2.8
0.20
-14
60
-56
40
-35
5

3/7=0.4286 ·½
3/14=0.2143

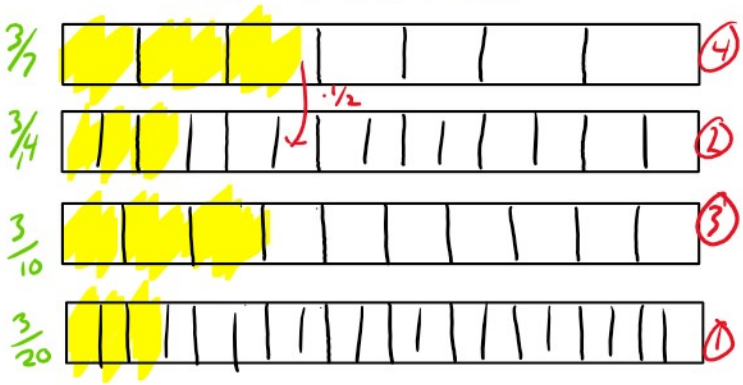
$\frac{3}{7} \cdot \frac{1}{2} = \frac{3}{14}$

3/10=0.3 ×½
3/20=0.15

$\frac{3}{10} \cdot \frac{1}{2} = \frac{3}{20}$

0.42..., 0.21..., 0.3, 0.15

Step 3 - Building Intuition

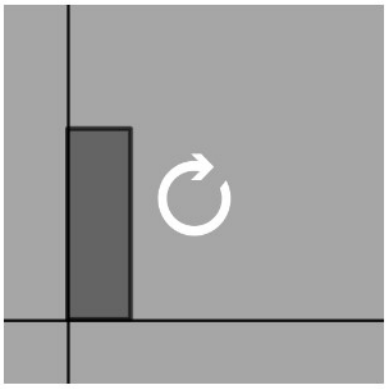


Same numerators

denom ↑ → decl

$\frac{3}{20} < \frac{3}{7}$

MPT_Q4



Question 5

Chris earns 80% of $175.

$\bar{x}$

How much does Chris earn?

- A ○ $14
- B ○ $35
- C ● $140
- D ○ $155

37% = 37 per cent ↳ century

37% = $\frac{37}{100}$ $\boxed{\text{pour cent}}$ cent=0.01$

Step 1 - Stuff We Need to Know

- ✓ The meaning of percent | Decimals | Pre-Algebra | Khan Academy
- ✓ Fraction decimal and percent from visual model
- ✓ Percentage of a whole number | Decimals | Pre-Algebra | Khan Academy
- ✓ Finding a percentage | Decimals | Pre-Algebra | Khan Academy

of x by $\div$

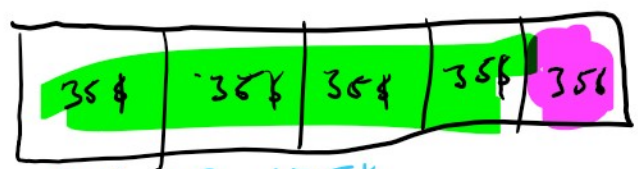
Step 2 - Duddhawork

$80\% = \frac{80}{100} \frac{\div 20}{\div 20}$ or $\frac{4}{5} = 0.8$

① 0.80*175=140

② $\frac{4}{\cancel{5}_{1}} \cdot 175 \div 5 = 140$ (35)

Step 3 - Building Intuition



20% of 175$

0.2*175=35

Question 6

A train leaves the station and has to travel 486 km.
The train maintains a speed of 120 km/h.

After travelling for 3 hours and 15 minutes, how much farther does the train have to travel to reach its destination?

- A 96 km
- B 150 km
- C 378 km
- D 390 km

$15\,\text{min} \times \frac{1\,\text{hour}}{60\,\text{min}} = \frac{15}{60} = 0.25\,\text{hour}$

Step 1 - Stuff We Need to Know

✓ Displacement from time and velocity example | One-dimensional motion | Physics | Khan Academy

velocity / speed

$v = \frac{d}{t}$ distance / time

$\frac{m}{s}$ $\frac{km}{h}$

Step 2 - Duddhawork

$v = \frac{d}{t} \Rightarrow d = v \cdot t$

(1) $d = 120\,\frac{km}{h} \cdot (3.25\ \text{hours})$

120*3.25=390

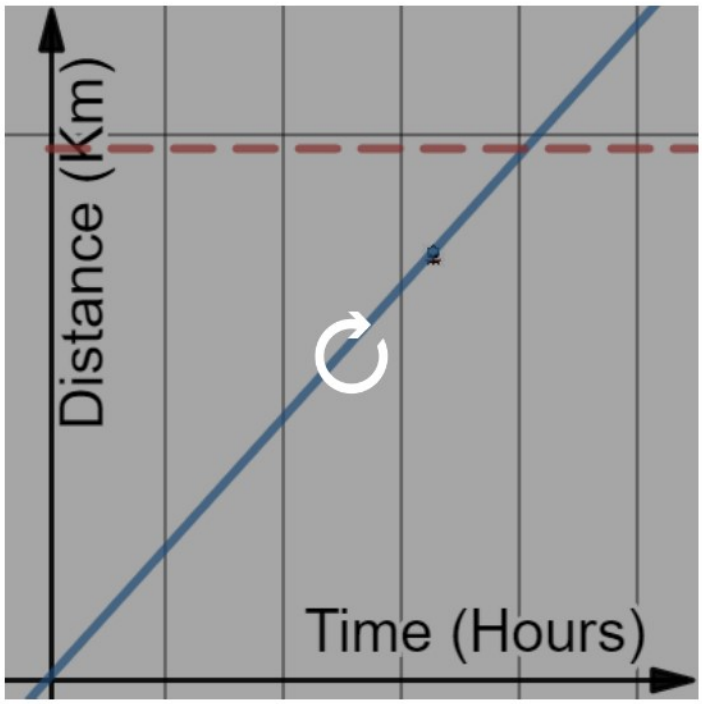
$d = 390\,km$ after 3.25 hour.

(2) Remaining: $486\,km - 390\,km$

$R = 96\,km$

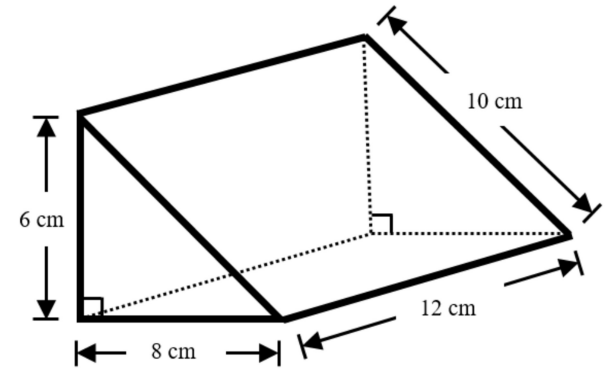
Step 3 - Building Intuition

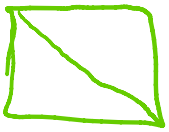
MPT_Q5 - Train



Question 7

What is the surface area of this triangular prism?





- A ○ 168 cm²
- B ○ 288 cm²
- C ● 336 cm²
- D ○ 384 cm²

Step 1 - Stuff We Need to Know

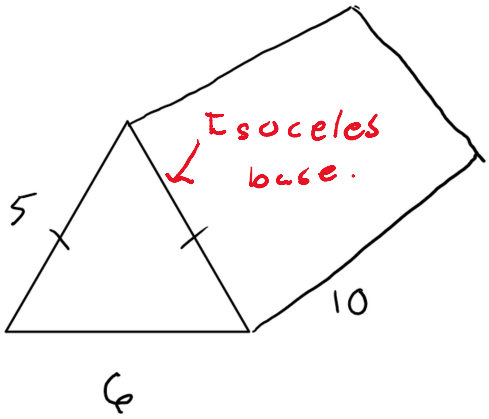
✓ Finding surface area using net

$$A_{\blacksquare} = b \times h$$
$$A_{\triangle} = \frac{1}{2} b \times h$$

$= \frac{b \times h}{2}$

Step 3 - Building Intuition

Find the surface area of the prism below



Solution:
2*(3*4/2)+2*(5*10)+1*(6*10)=172

Step 2 - Duddhawork

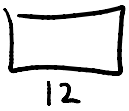
① Base

$A_{\triangle} = \frac{8 \cdot 6}{2} = 24\ cm^2$

② Sides

$= 12 \cdot 10 = 120$

$= 8 \cdot 12 = 96$



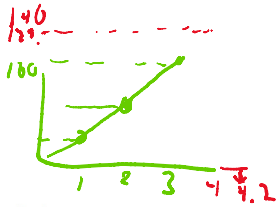
$= 6 \cdot 12 = 72$

2*24+120+96+72=336 cm^2

③ Total

$2(24\ cm^2) + 120\ cm^2 + 96\ cm^2 + 72\ cm^2$

Question 8



Mia drives 100 km in 3 hours.
She has 40 km left to her destination.

If she travels at the same speed, how much longer will it take her to get to her destination?

- A ○ 0.83 hours
- B ● 1.2 hours
- C ○ 1.33 hours
- D ○ 2.5 hours

Step 1 - Stuff We Need to Know

✓ Displacement from time and velocity example | One-dimensional motion | Physics | Khan Academy

Speed = $\frac{km}{h}$

$$speed = \frac{distance}{time}$$

Step 2 - Duddhawork

① Find her averaged speed

$$Speed = \frac{d}{t} = \frac{100\,km}{3\,h} = 33.\overline{3}\,\frac{km}{h}$$

Every hour she travels 33 km.

② Solve for time $v = \frac{d}{t}$

$t \cdot v = \frac{d}{t} \cdot t$

$t \cdot v = d$

$\frac{t \cdot v}{v} = \frac{d}{v}$

$t = \frac{d}{v}$

$t = \frac{d}{v} = \frac{40\,km}{33.\overline{3}\,\frac{km}{h}}$

40/33.3333=1.2

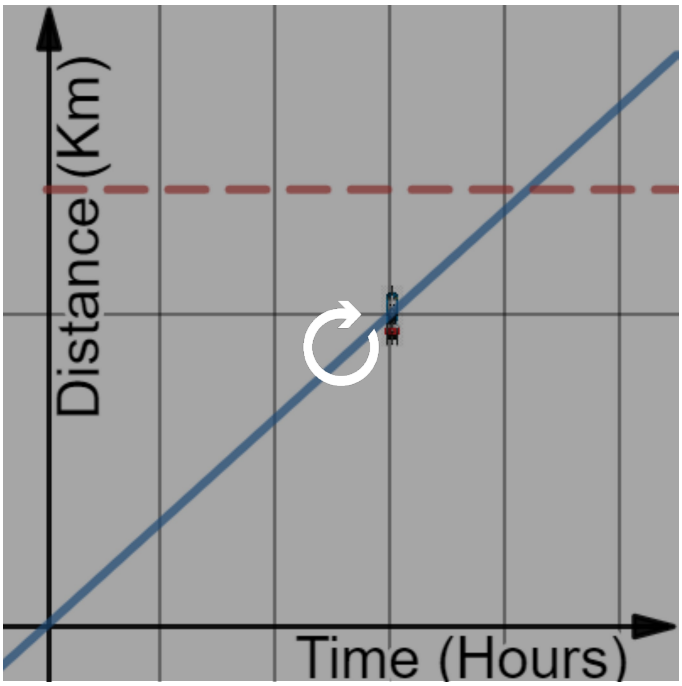
Units check

$t: km \div \frac{km}{h} \Rightarrow km \times \frac{h}{km}$ ✓

$t = \frac{40}{\frac{100}{3}} = 40 \times \frac{3}{100} = \frac{120}{100} = 1.2$

Step 3 - Building Intuition

MPT_Q8 - Drive



Question 9

What is the value of $\frac{3}{4} + 6 - \frac{1}{4}$?

- A $\frac{4}{8}$
- B $\frac{10}{8}$
- C $\frac{8}{4}$
- D $\frac{26}{4}$

Step 1 - Stuff We Need to Know

✓ Adding, subtracting fractions | Decimals | Pre-Algebra | Khan Academy *

Step 2 - Duddhawork

① Common Denominator.

$\frac{3}{4} + 6 \cdot \frac{4}{4} - \frac{1}{4}$

$a \cdot 1 = a$

multiplying by 1

$= \frac{3}{4} + \frac{24}{4} - \frac{1}{4} = \frac{3+24-1}{4} = \boxed{\frac{26}{4}}$

Step 3 - Building Intuition

① $\frac{26}{4} = 6\frac{2}{4} = 6\frac{1}{2} = 6.5$

26/4=6.5

$$\begin{array}{r} 06.5 \\ 4\overline{)26} \\ 24 \\ \hline 20 \\ 20 \\ \hline 0 \end{array}$$

Question 10

Three students each shade a different part of a 10×10 grid. Their shaded parts do not overlap.

- Kory shades 0.71 of the grid.
- Nabil shades 19% of the grid.
- Sydney shades $\frac{2}{25}$ of the grid.

Which of the following represents the **unshaded** part of the grid?

A ○ 0.2 of the grid

B ● 2% of the grid

C ○ $\frac{1}{2}$ of the grid

D ○ 98% of the grid

Step 1 - Stuff We Need to Know

- ✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy
- ✓ Fraction decimal and percent from visual model

% ↔ decimals ↔ Fractions

Step 2 - Duddhawork

① Convert all to $\frac{\#}{100}$

$0.71 = \frac{71}{100} = 0.71$

per cent → 1 hundred

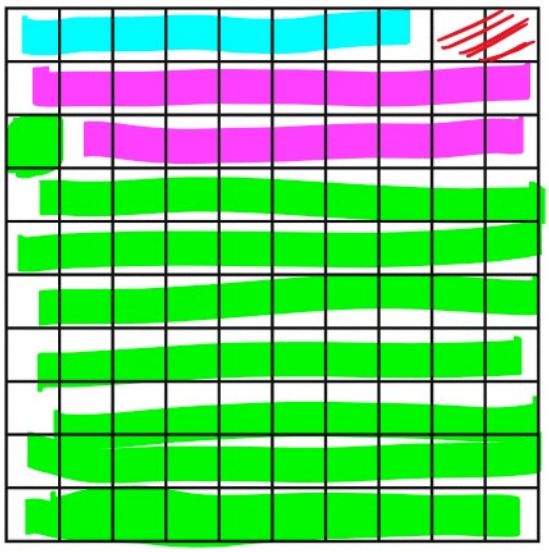
$19\% = \frac{19}{100} = 0.19$

$\frac{2}{25} \left(\frac{4}{4}\right) = \frac{8}{100} = 0.08$

↳ mult by 1 $a \cdot 1 = a$

Step 3 - Building Intuition

= 2%
2 squares/100



② Add All fractions

shaded

$\frac{71}{100} + \frac{19}{100} + \frac{8}{100} = \frac{98}{100}$

↳ ∴ 2% unshaded $(1 - \frac{98}{100} = \frac{2}{100})$

Question 11

The cost of 5 avocados is $3.70.

What is the cost per avocado?

- A $0.74
- B $1.35
- C $3.65
- D $18.50

Step 1 - Stuff We Need to Know

✓ Solving unit price problem | Ratios, proportions, units, and rates | Pre-Algebra | Khan Academy

Step 2 - Duddhawork

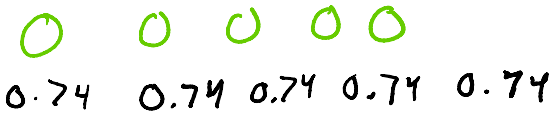
Find $/1 avocado

$$\frac{3.70\$}{5 \text{ avocado}} = \frac{3.70}{5} \frac{\$}{\text{Avocado}}$$

3.70/5=0.74

$$0.74 \frac{\$}{\text{Avocado}}$$

Step 3 - Building Intuition



0.74+0.74+0.74+0.74+0.74=3.7
OR
0.74*5=3.7

✓

Question 12

Roz and Sam are making sandwiches for their school picnic. Whenever Roz makes 5 sandwiches, Sam makes 4 sandwiches. Together they make 72 sandwiches.

How many sandwiches does Sam make?

- A ○ 8
- B ○ 18
- C ● 32
- D ○ 40

Step 1 - Stuff We Need to Know

- ✓ Ratios for recipes
- ✓ Ratio word problem examples

r = # sandwiches Roz makes

S = # sandwiches Sam makes

T = Total # of sandwhiches same ammount of time.

Step 2 - Duddhawork

$S = \frac{4}{5} r$ | if $r=1, S=\frac{4}{5}$

if $r=10, S=8 \Rightarrow$ 80% rate ✓

Step 2

$T = r + \frac{4}{5} r$

$T = \frac{5}{5} r + \frac{4}{5} r$

$T = \frac{9}{5} r$ AND $T=72$

$72 = \frac{9}{5} r$

$r = 40$

Step 2

$T = r + S$

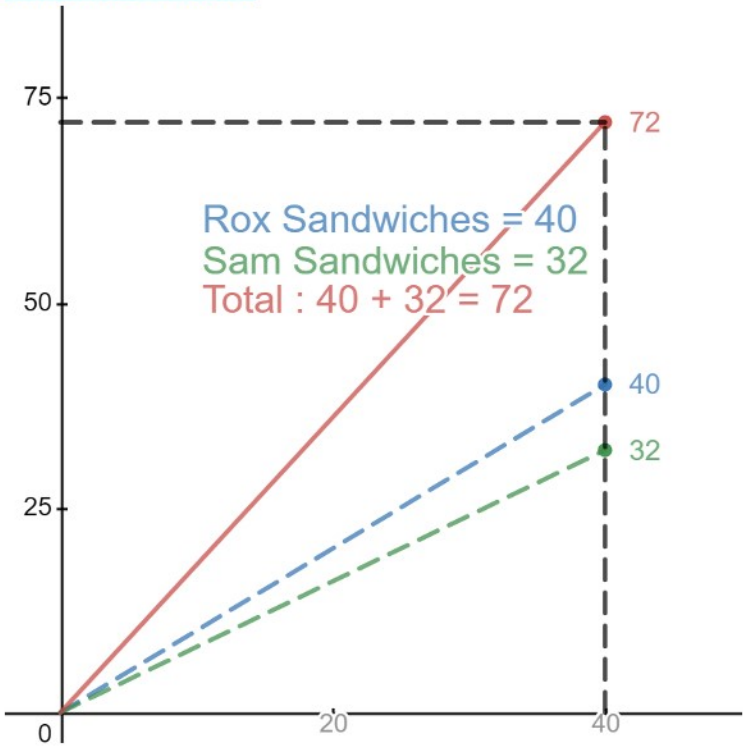
$72 = 40 + S$

$S = 72 - 40$

$S = 32$

Step 3 - Building Intuition

Sandwich Problem



Question 13

After a discount, the sale price of an item is 65% of its original price.

Which of these fractions represents the discount?

A $\frac{6}{10}$

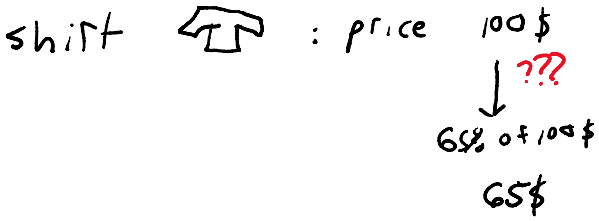
B $\frac{7}{13}$

C $\frac{7}{20}$

D $\frac{3}{10}$

Step 1 - Stuff We Need to Know

✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy



Step 2 - Duddhawork

Discount: 100% - 65% = 35%

mult by 1

A $\frac{6}{10} \cdot \frac{10}{10} = \frac{60}{100} = 0.6 = 60\%$ X

B $\frac{7}{13}$ 7/13=0.5385 X

C $\frac{7}{20} \cdot \frac{5}{5} = \frac{35}{100} = 35\%$ 7/20=0.35 ✓

D $\frac{3}{10} = \frac{30}{100} = 0.3 = 30\%$ X

Step 3 - Building Intuition

Consider a shirt that cost 17.27$ with a 35% discount. What is its final price assuming a 13% tax?

Method I

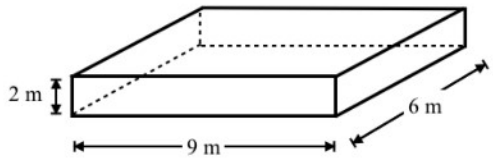
Discount
17.27*(0.35)=6.0445
Initial price - discount
17.27-6.04=11.23
Tax
11.23*(0.13)=1.4599
Add Tax
11.23+1.46=12.69

Method II

Discount
17.27*(0.65)=11.2255
Add Tax
11.23*1.13=12.6899

Question 14

A truck is filling a container with sand.
The container is in the shape of a rectangular prism as pictured.



The truck puts 40 m³ of sand in the container.

How much **more** sand is needed to completely fill the container?

- A ○ 14 m³
- B ● 68 m³
- C ○ 108 m³
- D ○ 148 m³

Step 2 - Duddhawork

(1) Total Volume: $2m \times 9m \times 6m$

$V_T = 108\ m^3$

(2) Sand Volume: $40m^3$

$V_s = 40m^3$

(3) Remainder V_r $(V_T = V + V_r)$

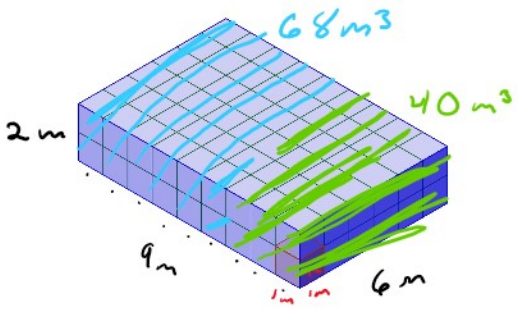
$V_r = V_T - V_s$

$V_r = 108m^3 - 40m^3$

$V_r = 68m^3$

Step 1 - Stuff We Need to Know

- ✓ Volume of a rectangular prism or box examples | Measurement | Pre-Algebra | Khan Academy
- ✓ Making a Rectangular Prism by Scaling a Cube



Step 3 - Building Intuition

Percentage approach

$\frac{40}{108} = 37\%$ Full $\qquad \frac{68}{108} = 63\%$ Left

Percentage Full
40/108=0.3704
Percentage Left
68/108=0.6296
Volume Left
108*0.63=68.04

Question 15

Which option shows $3^{11} \times 3^2$ as a single power?

- A 3^{13}
- B 3^{22}
- C 9^{13}
- D 9^{22}

Step 2 - Duddhawork

$3^{11} \cdot 3^2 = 3^{11+2} = 3^{13}$

Evaluate the power

$3 \cdot 3 \cdot 3 \cdots 3 = 1594323$ (13 times)

3^(13)=1,594,323
3^2 *(3^(11))=1,594,323

Step 1 - Stuff We Need to Know

✓ Exponent properties involving products | Numbers and operations | 8th grade | Khan Academy

$a^m \cdot a^n = a^{m+n}$

Step 3 - Building Intuition

$3^{11} \times 3^2 = (3 \cdot 3 \cdots 3) \times (3 \times 3) = 3^{11+2}$ (11 times; 2 times)

$= 3 \cdot 3 \cdot 3 \cdots 3) = 3^{13}$ (13 times)

$\frac{3^{11}}{3^2} = \frac{3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3}{3 \cdot 3} = 3^{11-2} = 3^9$

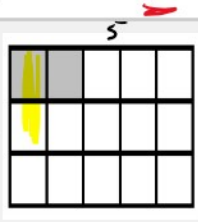
$(3^{11})^2 = (3^{11}) \cdot (3^{11}) = 3^{11+2} = 3^{22}$

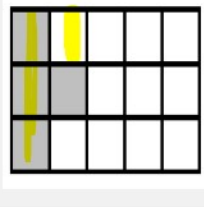
$= (3 \cdot 3 \cdots 3) \times (3 \cdot 3 \cdots 3)$ (11 times; 11 times)

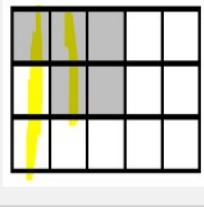
$= (3 \cdot 3 \cdots 3)$ (22 times)

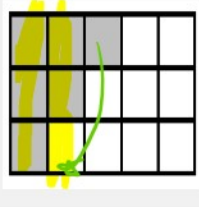
Question 16

Which representation shows that $\frac{2}{5}$ of the squares are shaded?

A 

B 

C 

D 

Step 2 - Duddhawork

$\frac{2}{15} \xrightarrow{\div 3} \frac{2/3}{5}$

$\frac{4}{15} \xrightarrow{\div 3} \frac{4/3}{5}$

$\frac{5}{15} = \frac{5/3}{5}$

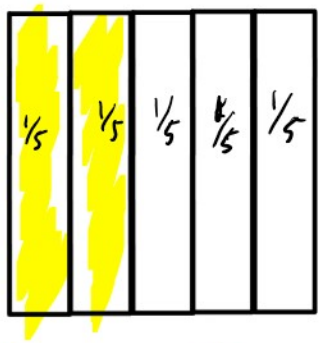
$\frac{6}{15} = \boxed{\frac{2}{5}}$

Step 1 - Stuff We Need to Know

✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy

3 x 5 Grid ⇒ 15 squares

Step 3 - Building Intuition



$\frac{2}{5} = 0.4 = 40\%$

2/15=0.1333 versus 6/15=0.4

Question 17

Which fraction is an equivalent representation of 8%?

A ✓ $\frac{2}{25}$

B ○ $\frac{2}{20}$

C ○ $\frac{1}{8}$

D ○ $\frac{8}{10}$

Step 1 - Stuff We Need to Know

✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy

① Divide num. by denum.

② Equivalent fraction $\frac{\square}{100}$

per cent^{100}

Step 2 - Duddhawork

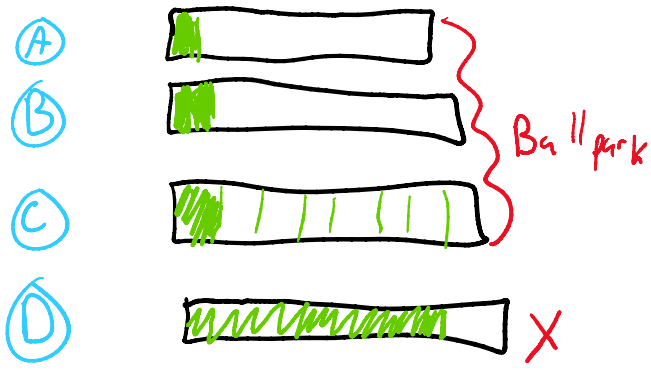
(A) $\frac{2}{25} \times 4 \rightarrow \frac{8}{100} = 0.08 = 8\%$ ✓

(B) $\frac{2}{20} \times 5 \rightarrow \frac{10}{100} = 0.1 = 10\%$ X

(C) $\frac{1}{8} \rightarrow \frac{x}{100}$ 1/8=0.125 $= 12.5\%$ X

(D) $\frac{8}{10} \rightarrow \frac{80}{100} = 0.8 = 80\%$ X

Step 3 - Building Intuition



Question 18

A bag contains 170 marbles.
There are red, blue and yellow marbles in a ratio of $9:3:5$.

How many yellow marbles does the bag contain?

- A ○ 5 yellow marbles
- B ○ 10 yellow marbles
- C ○ 34 yellow marbles
- D ● 50 yellow marbles

Step 2 - Duddhawork

step 1

Total = 9 + 3 + 5 = 17 marbles

Step 2 : Yellow / Total

$\frac{5}{17}$ = 5/17=0.2941 — 29% marbles are yellow

Equivalent frac

$\frac{5}{17} = \frac{50}{170}$ (×10 / ×10)

Percentage

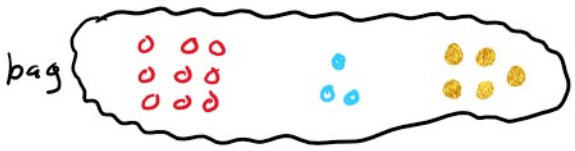
0.2941*170=49.997 ≈ 50

Exact

$\frac{5}{17} \cdot \frac{170}{1} = 50$ (÷17)

Step 1 - Stuff We Need to Know

✓ Finding probability example | Probability and Statistics | Khan Academy



Step 3 - Building Intuition

In R a Programming language

```r
red <- 9
blue <- 3
yellow <- 5

colours <- c(red, blue, yellow)

total <- sum(colours)

# Probability of selecting each marble
probabilities <- colours/total

set.seed(2020)
# Sample 1000 marbles
n <- 1000
sample <- sample(x = c("red", "blue", "yellow"),
                 size = n, replace = TRUE,
                 prob = probabilities)

# Observed probabilities
table(sample)/n

# True probabilities
round(probabilities, 3)
```

vector [9 3 5]

9+3+5 = 17

[9/17, 3/17, 5/17] 0.29

simulation

marbles

1000

options in the bag

```
> # Observed probabilities
> table(sample)/n
sample
  blue    red yellow
 0.171  0.549  0.280
> # True probabilities
> round(probabilities, 3)
[1] 0.529 0.176 0.294
```

In the bag.

True.

Question 19

Merrick's mean score on 8 tests is 72.

What is the total of the scores for the 8 tests?

- A ○ 64
- B ○ 80
- C ● 576
- D ○ 648

Step 2 - Duddhawork

$$M = \frac{T}{n}$$

$$72 = \frac{T}{8} \quad \Rightarrow T = 8 \cdot 72$$

$$T = 576$$

72+72+72+72+72+72+72+72=576
OR
8*72=576

Step 1 - Stuff We Need to Know

✓ Averages | Linear equations | Algebra I | Khan Academy

$$M = \frac{T}{n}$$

(72+72+72+72+72+72+72+72)/8=72

Step 3 - Building Intuition

What would be your final grade?

	Term	Exam
Weight	60%	40%
Grade	87%	73%

Comment your answer below!

Weighted Average

(0.87)*60+(0.73)*40=81.4

Final Grade: 81.4%

Question 20

Step 2 - Duddhawork

Which of the following tables shows a fraction, a decimal and a percent that are equal in value?

A

Fraction	Decimal	Percent
$\frac{4}{5}$	0.45	45%

$\frac{4}{5} = 0.8$ ✗

B

Fraction	Decimal	Percent
$\frac{3}{20}$	0.15	15%

✓ $\frac{3}{20} \times \frac{5}{5} = \frac{15}{100} = 0.15 = 15\%$

C

Fraction	Decimal	Percent
$\frac{9}{30}$	0.3	3%

✗

D

Fraction	Decimal	Percent
$\frac{5}{100}$	0.5	5%

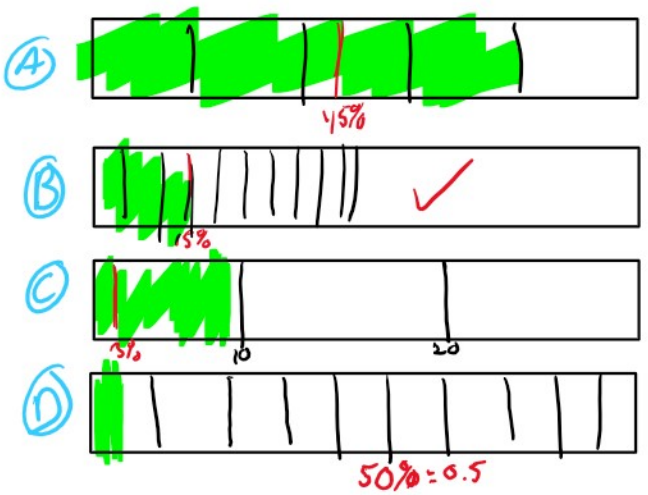
✗

Step 1 - Stuff We Need to Know

✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy

4/5=0.8

Step 3 - Building Intuition



Question 21

Which option describes the sum of $\frac{11}{5} + \frac{1}{7}$?

- A ○ 1 ✗
- B ○ 2 $= \frac{70}{35}$ ✗
- C ○ between 1 and 2 $\frac{82}{35} > \frac{70}{35}$ ✗
- D ✓ between 2 and 3

Step 1 - Stuff We Need to Know

✓ Adding fractions with unlike denominators

✓ Fractions on a number line | Fractions | 3rd grade | Khan Academy

$a \cdot 1 = a$

Common denominator.

$\frac{a}{b}\cdot\frac{d}{d} + \frac{c}{d}\cdot\frac{b}{b} = \frac{ad}{bd} + \frac{bc}{bd} = \frac{ad+bc}{bd}$

Step 2 - Duddhawork

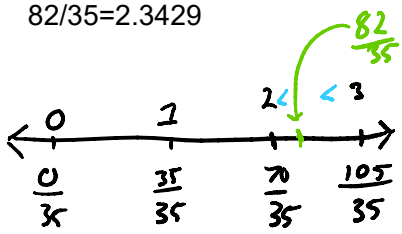
$\frac{11}{5}\cdot\frac{7}{7} + \frac{1}{7}\cdot\frac{5}{5}$

$= \frac{77}{35} + \frac{5}{35}$

$= \frac{77+5}{35} = \frac{82}{35}$

Step 3 - Building Intuition

82/35=2.3429



Question 22

The first four terms of a growing pattern are shown.

$$\frac{1}{64}, \frac{1}{32}, \frac{1}{16}, \frac{1}{8}, \ldots$$

What is the 7th term in this pattern?

- A ○ 2
- B ● 1
- C ○ $\frac{1}{2}$
- D ○ $\frac{1}{4}$

Step 1 - Stuff We Need to Know

✓ Introduction to geometric sequences | Sequences, series and induction | Precalculus | Khan Academy

arithmetic: Add/sub
2, 4, 6, 8, ...
geometric: Mult/div
2, 4, 8, 16, 32, ...

$a_n = ar^{n-1}$

nth Term, first term, common ratio

Step 2 - Duddhawork

Method I - Manually

$\frac{1}{64}, \frac{1}{32}, \frac{1}{16}, \frac{1}{8}, \frac{1}{4}, \frac{1}{2}, 1$

×2 ×2 ×2 ×2 ×2 ×2

n:1 n:2 n:3 n:4 n:5 n:6 n:7

Method II - Formula

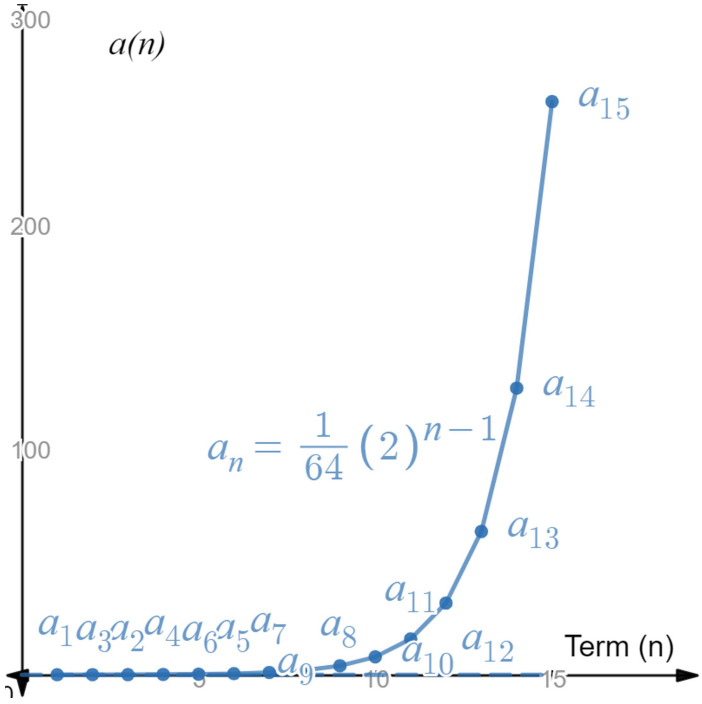
$a_n = ar^{n-1}$

$a_n = \left(\frac{1}{64}\right)(2)^{n-1}$

$a_7 = \frac{1}{64}(2)^6 = \frac{1}{64}(64) = 1$

Step 3 - Building Intuition

MPT Q22 What is the 15th term?



Question 23

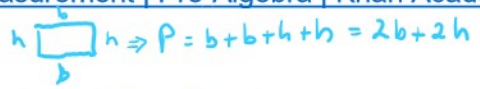
Which of the following dimensions produces a rectangle with the smallest perimeter?

$A = b \times h$

A ○	10 m × 120 m	1200
B ●	30 m × 40 m	1200
C ○	50 m × 24 m	1200
D ○	60 m × 40 m	2400

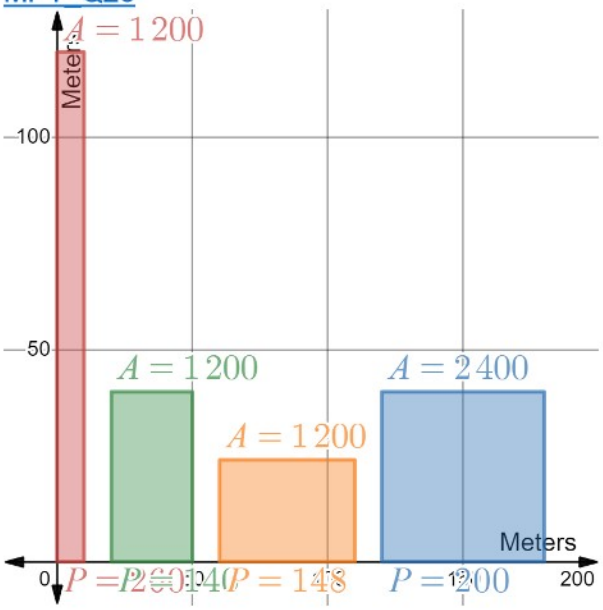
Step 1 - Stuff We Need to Know

✓ Comparing areas and perimeters of rectangles | Measurement | Pre-Algebra | Khan Academy



Step 3 - Building Intuition

MPT_Q23



Step 2 - Duddhawork

(A) $P_A = 2 \cdot 10 + 2 \cdot 120 = 20 + 240 = 260\text{m}$

(B) $P_B = 2 \cdot 30 + 2 \cdot 40 = 60 + 80 = 140\text{m}$

(C) $P_C = 2 \cdot 50 + 2 \cdot 24 = 100 + 48 = 148\text{m}$

(D) $P_D = 2 \cdot 60 + 2 \cdot 40 = 120 + 80 = 200\text{m}$

Question 24

What is 19 thousands $+$ 7 tens?

- A ○ 190 070
- B ● 19 070
- C ○ 19 000.7
- D ○ 0.000197

Step 1 - Stuff We Need to Know

✓ Adding multi digit numbers with regrouping

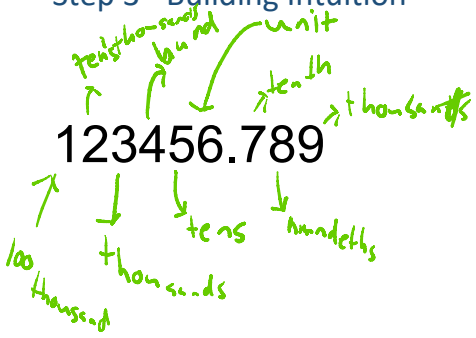
Step 2 - Duddhawork

$19 \cdot 1000 + 7 \cdot 10$

$= 19\,000 + 70$

$19\,000$
$+\ 00\,070$
$19\,070$

Step 3 - Building Intuition



Question 24

What is 19 thousands $+$ 7 tens?

- A ○ 190 070
- B ○ 19 070
- C ○ 19 000.7
- D ○ 0.000197

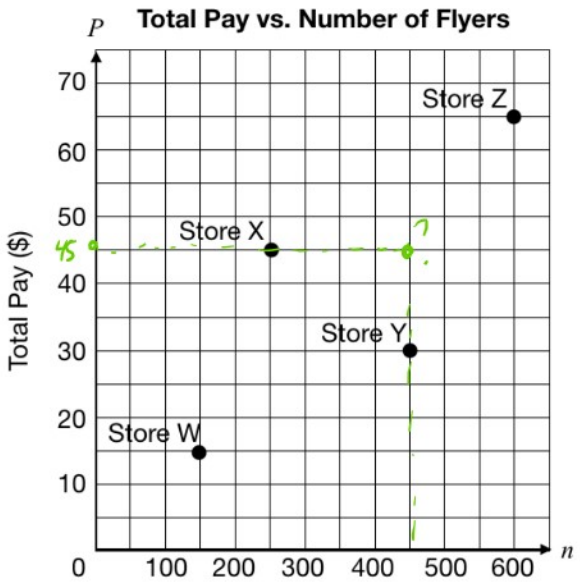
$19 \cdot 1000 + 7 \cdot 10$

$= 19\,000 + 70$

$19\,000$
$+\ 00\,070$
$19\,070$

Question 25

Four stores hire people to deliver flyers.
Each store pays a different amount per flyer delivered.
The points on the graph below show the total pay for a certain number of flyers delivered for each of the stores.



Which store will pay $45 for 450 flyers delivered?

- A Store W
- B Store X
- C Store Y
- D Store Z

Step 1 - Stuff We Need to Know

✓ Solving unit rates problem | Ratios, proportions, units, and rates | Pre-Algebra | Khan Academy

Step 2 - Duddhawork

Step 1 - Rates	Step 2 - Equations
$\frac{15\$}{150 \text{ Flyers}} = 0.1 \frac{\$}{\text{Flyer}}$	$P_W = 0.1 \frac{\$}{\text{Flyer}} (450 \text{ Flyer}) = 45\$$ ③
$\frac{45\$}{250 \text{ Flyers}} = 0.18 \frac{\$}{\text{Flyer}}$	$P_X = 0.18 \cdot 450 = 81\$$ ①
$\frac{30\$}{450 \text{ Flyer}} = 0.0\overline{6} \frac{\$}{\text{Fly}}$	$P_Y = 0.0\overline{6} \frac{\$}{\text{Fly}} \cdot 450 = 30\$$ ④
$\frac{65\$}{600 \text{ Flyer}} = 0.1083 \frac{\$}{\text{Fly}}$	$P_Z = 0.1083 \cdot 450 = 48.74\$$ ②

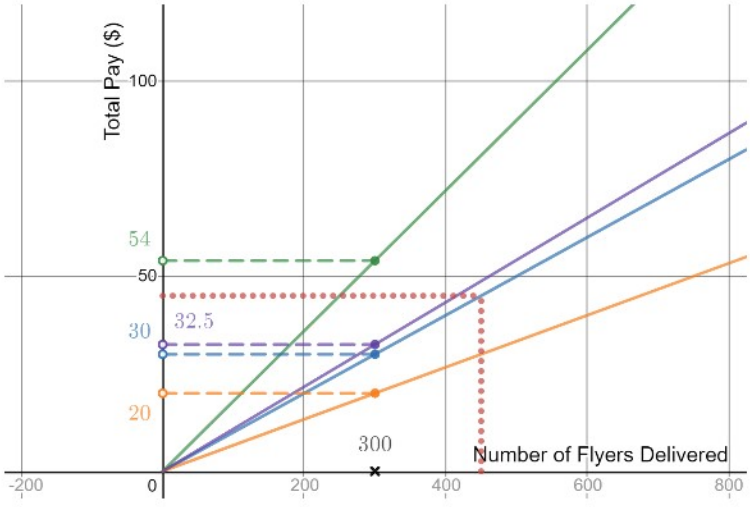
W X Y Z

$y = mx + b$

Pay = rate (#Flyers) + 0

Step 3 - Building Intuition

MPT_Q25



Question 26

The cost of 12 cookies is $\$7.56$.
Each cookie costs the same amount.

What is the cost of 14 of these cookies?

- A ○ $0.54 ✗
- B ○ $0.63 ✗
- C ● $8.82
- D ○ $9.56

Step 1 - Stuff We Need to Know

- ✓ Proportion word problem (example 1) | 7th grade | Khan Academy
- ✓ Solving unit rates problem | Ratios, proportions, units, and rates | Pre-Algebra | Khan Academy

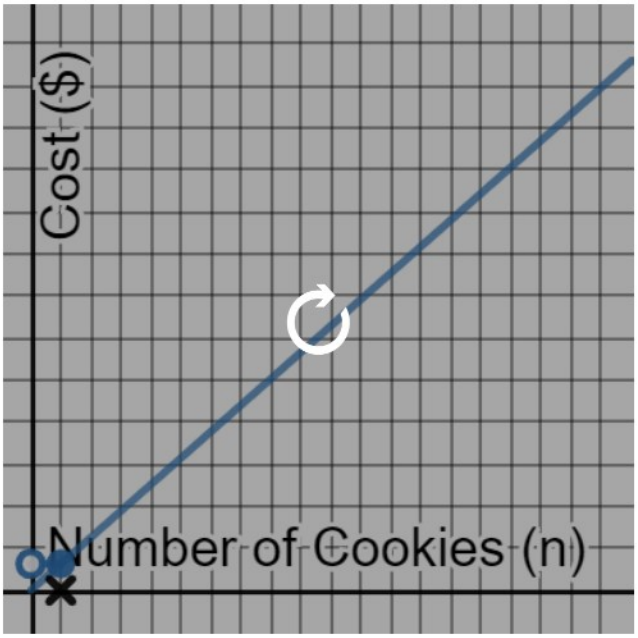
$y = mx + b$ → # cookies

Total Cost → $C = r(n) + 0$ ← no initial cost

↳ r $/cookie

Step 3 - Building Intuition

MPT Q26 $C(n) = 0.63n \Rightarrow n = 1000?$ $C(1000) = 0.63 \cdot 1000 = \$630$



Step 2 - Duddhawork

(1) Price for 1 cookie

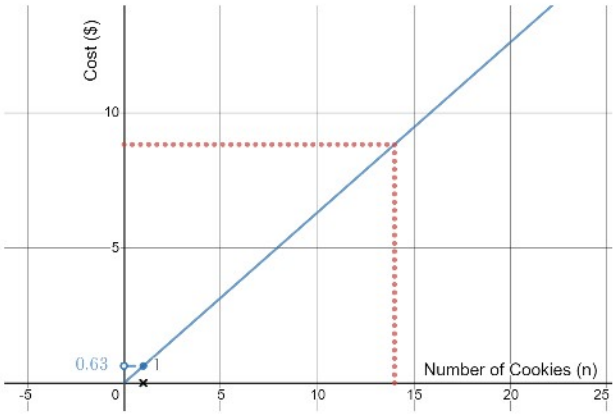
7.56/12=0.63

$\frac{7.56\$}{12 \text{ cookies}} = 0.63\frac{\$}{\text{cookie}}$

0.63*12=7.56

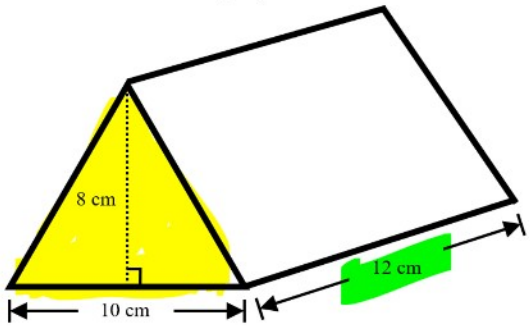
(2) $0.63\frac{\$}{\text{cookie}} \cdot 14 \text{ cookies} = 8.82\$$

0.63*14=8.82

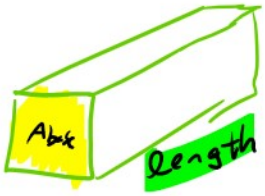


Question 27

What is the volume of this triangular prism?



- A ○ 80 cm^3
- B ○ 120 cm^3
- C ● 480 cm^3
- D ○ 960 cm^3



$V = A_{base} \cdot length$

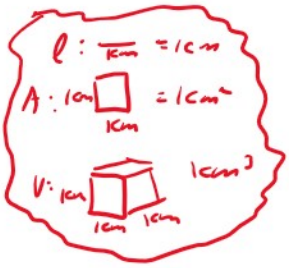
Step 2 - Duddhawork

$V = A_{base} \cdot length$

$V = \frac{b \times h}{2} \cdot l$

$V = \frac{10_{cm} \cdot 8_{cm}}{2} \cdot 12^{6}_{cm}$

$V = 480\,cm^3$



Step 3 - Building Intuition

What is the volume of this prism?

$V = A_{base} \cdot length$

$V = \left[\underset{①}{(b \cdot h)} + \underset{②}{\frac{1}{2}\pi r^2}\right] \cdot l$

$V = \left[(6 \cdot 10) + \frac{1}{2}\pi\, 3^2\right] \cdot 2$

$V = \left[60 + \frac{9}{2}\pi\right] \cdot 2$

$V = 120 + 9\pi$

120+9*pi=148.2743338823081

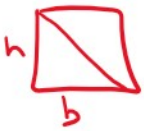
$V = 148.27\,cm^3$

Step 1 - Stuff We Need to Know

✓ Find the volume of a triangular prism and cube | Geometry | Khan Academy

$$V = A_{base} \times length$$

$$V = \frac{b \times h}{2} \times length$$



$A_0 = \frac{b \cdot h}{2}$

Question 28

The first four terms of a pattern are shown.

$$1683, 1598, 1513, 1428, \ldots$$

-85 -85 -85

The pattern continues to decrease by the same amount.

What is the 9th term in this pattern?

- A ○ 918
- B ● 1003
- C ○ 1088
- D ○ 1173

Step 1 - Stuff We Need to Know

✓ Introduction to arithmetic sequences | Sequences, series and induction | Precalculus | Khan Academy

$$a_n = a + (n-1)d$$

nth term

first term

common difference

index

$a_n = a + nd - d$

$a_n = dn + (a-d)$

$y = mx + b$

Step 2 - Duddhawork

① common difference

1683-1598=85 1598-1513=85 $d = -85$

② Formula

$y = mx + b$

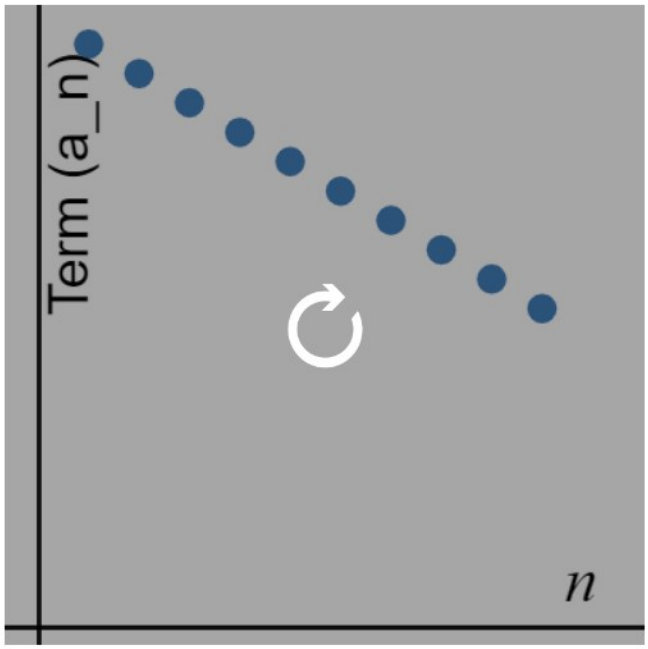
$a_n = 1683 + (n-1)(-85) \Rightarrow a_n = -85n + 1768$

$a_9 = 1683 + (9-1)(-85)$ 1683-8*85=1003

Step 3 - Building Intuition

What is the equation of this line?

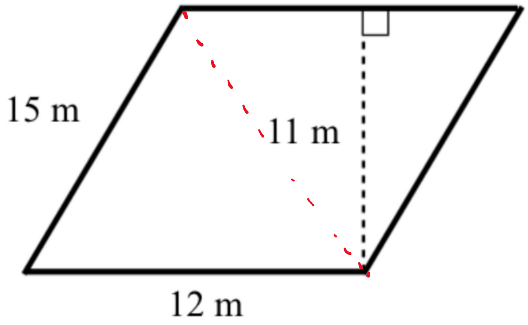
MPT_Q28



Question 29

The parallelogram below will be cut into two congruent triangles.

What is the area of each triangle?



- A 66 m^2
- B 90 m^2
- C 132 m^2
- D 180 m^2

Step 1 - Stuff We Need to Know

✓ Area of parallelograms intuition | Algebra I | High School Math | Khan Academy

$A = b \times h$

Step 2 - Duddhawork

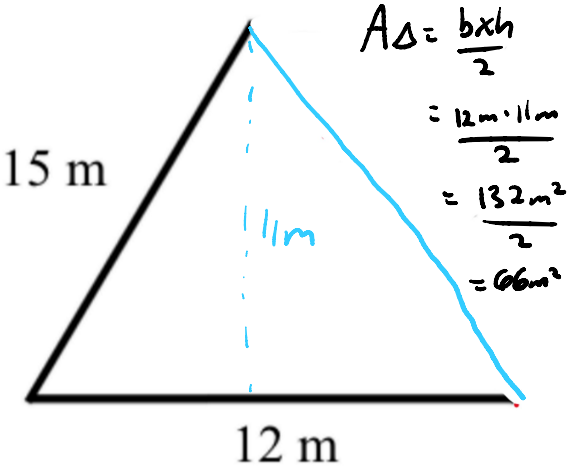
(1) $A_{\square} = b \times h$

$= 12m \times 11m$

$= 132\ m^2$

(2) $A_{\triangle} = \frac{A_{\square}}{2} = \frac{132\ m^2}{2} = 66m^2$

Step 3 - Building Intuition



$A_{\triangle} = \frac{b \times h}{2}$

$= \frac{12m \cdot 11m}{2}$

$= \frac{132m^2}{2}$

$= 66m^2$

Question 30

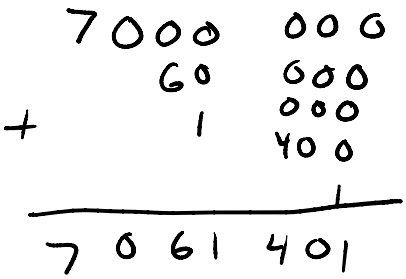
Which of the following represents the number $7\ 061\ 401$ in expanded form?

- A ○ $7\,000\,000 + 600\,000 + 10\,000 + 400 + 1$
- B ● $7\,000\,000 + 60\,000 + 1000 + 400 + 1$
- C ○ $700\,000 + 60\,000 + 1000 + 400 + 1$
- D ○ $70\,000 + 60\,000 + 10\,000 + 400 + 1$

Step 1 - Stuff We Need to Know

✓ Adding: why carrying works | Addition and subtraction | Arithmetic | Khan Academy
✓ Adding multi digit numbers with regrouping

Step 2 - Duddhawork



Step 3 - Building Intuition

Adding whole numbers by their place values | Math | 4th grade | Khan Academy

Question 31

A video game has 15 levels.
Brom has completed 6 levels.

What percent of the levels has Brom completed?

- A ○ 6% ✗
- B ○ 9% ✗
- C ● 40% ✓
- D ○ 60%

Step 1 - Stuff We Need to Know

✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy

$\frac{2}{3} = 2 \div 3 = 0.666\ldots \approx 67\%$

Step 2 - Duddhawork

M1

$\frac{6}{15} \overset{\div 3}{=} \frac{2}{5} \overset{\times 20}{=} \frac{40}{100} = 40\%$

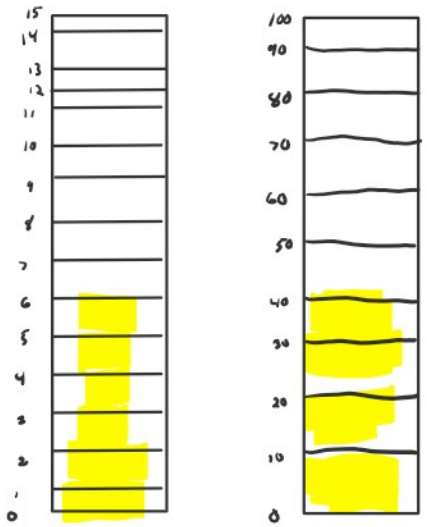
a · 1 = a

M2

6/15=0.4 = 40%

per cent hundred

Step 3 - Building Intuition



$\frac{6}{15} = \frac{40}{100}$

Question 32

Zeyad has a bag of 40 marbles.

- $\frac{1}{4}$ of them are red.
- 12 are blue.
- The rest are white.

He reaches into the bag without looking.

What is the probability that Zeyad will select a white marble?

- A ○ 0.18
- B ○ 0.40
- C ● 0.45
- D ○ 0.55

Step 1 - Stuff We Need to Know

✓ Finding probability example | Probability and Statistics | Khan Academy

✓ Finding probability example 2 | Probability and Statistics | Khan Academy

✱ $P(w) = \frac{\# w}{\text{TOTAL } \# \text{ marbles}} = \frac{w}{r+b+w}$

Step 2 - Duddhawork

by = ÷

① of = x

red $\frac{1}{4}$ of 40 $= \frac{1}{\cancel{4}_{1}} \times \cancel{40}^{10} = 10$

$r = 10$

$b = 12$

$w = 18$

10+12+18=40

$w = 40 - 10 - 12 = 18$

② $P(w) = \frac{n \text{ white}}{\text{Total } n} = \frac{18}{40}$ 18/40=0.45

$P(w) = 0.45 = 45\% = \frac{45}{100}$

Step 3 - Building Intuition

R

```
# Number of Marbles in the bag
M <- 40

# Number of Red marbles
n_red <- (1/4) * M
# Number of Blue marbles
n_blue <- 12
# Number of White marbles
n_white <- M - n_red - n_blue

# Create vectors for each colour
red <- rep("red", n_red)
blue <- rep("blue", n_blue)
white <- rep("white", n_white)

# Create a bag by combining all colours
bag <- c(red, white, blue)
bag

# Sample 100 marbles
n <- 100
set.seed(123)
sample <- sample(x = bag, size = n, replace = TRUE)

# Observed probabilities
table(sample)/n

# True probabilities
table(bag)/M
```

= 10

= 18

(red, red, red, ...; red) 10 times

reproducible

```
> bag
 [1] "red"   "red"   "red"   "red"   "red"   "red"   "red"   "red"   "red"   "red"   "white" "white" "white"
[14] "white" "white" "white" "white" "white" "white" "white" "white" "white" "white" "white" "white" "white"
[27] "white" "white" "blue"  "blue"  "blue"  "blue"  "blue"  "blue"  "blue"  "blue"  "blue"  "blue"  "blue"
[40] "blue"
```

```
> table(sample)/n
sample
 blue   red white
 0.32  0.21  0.47
> # True probabilities
> table(bag)/M
bag
 blue   red white
 0.30  0.25  0.45
```

$n \uparrow$

Emperical True

$p \rightarrow p_0$

Question 33

Last year Diana sold 800 necklaces.
This year she sold 1080 necklaces.

What is the percentage increase of necklaces she sold?

A ○ 13.5%

B ○ 26%

C ● 35%

D ○ 74%

Step 1 - Stuff We Need to Know

✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy

Revenue = (units sold)(price per unit)

Cost = (units sold)(cost per unit)

Profit = Revenue − Cost

Step 2 - Duddhawork

800/1080=0.7407

1080/800=1.35 = 35% ↑

2nd / 1st: 150/100 = 1.5 = 50% ↑

Step 3 - Building Intuition

Let's pretend each necklace was sold for 10$ and they cost 2$ to Diana to make. Did her profit also increase by the same percentage as her sales?

Year 1:

$P_1 = R_1 - C_1 = 800(10\$) - 800(2) = 8000 - 1600 = 6400\$$

$P_1 = 6400\$$

Year 2

$P_2 = R_2 - C_2$ = 1080*10-1080*2=8640 $

$P_2 = 8640\$$

% Increase

8640/6400=1.35

Profits ↑ by 35% ✓

Question 34

Sasha has 4 yellow shirts, 10 grey shirts and 7 red shirts in her closet.

What is the ratio of red shirts to grey shirts in her closet?

- A 7:4
- B 7:10
- C 10:7
- D 10:4

Step 1 - Stuff We Need to Know

✓ Introduction to ratios | Ratios, rates, and percentages | 6th grade | Khan Academy

win lose

2 : 1

3 games

2 wins, 1 loss

onions spice

4 : 5 $\frac{4}{5}$ $\frac{\text{onions}}{\text{spice}}$

Step 2 - Duddhawork

red : Grey

7 : 10

$\frac{7}{10}$ $\frac{\text{red}}{\text{Grey}}$ = 0.7 $\frac{\text{red}}{\text{shirt}}$

Step 3 - Building Intuition

Let's pretend she closes her eyes and picks a shirt at random. What is the probability that she picks red shirt?

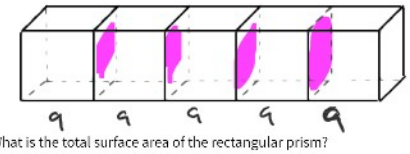
$$P(r) = \frac{\#r}{\text{Total \#shirts}} = \frac{r}{y+g+r}$$

$$= \frac{7}{4+10+7} = \frac{7 \div 7}{21 \div 7} = \frac{1}{3} = 0.\overline{33}$$

$\therefore$ $\boxed{P(r) = 33\%}$

Question 35

Laila connects 5 boxes to create a rectangular prism as shown below.
The dimensions of each of the 5 boxes are $9\text{ cm} \times 9\text{ cm} \times 9\text{ cm}$.



What is the total surface area of the rectangular prism?

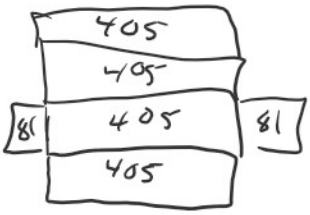
- A ○ 405 cm^2
- B ○ 1620 cm^2
- C ● 1782 cm^2
- D ○ 3645 cm^2

$5 \times 9\text{cm} = 45\text{cm}$

Step 1 - Stuff We Need to Know

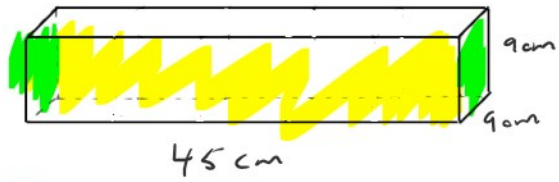
✓ Surface area of a box

$A_{\square} = b \times h$



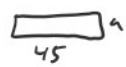
405*4+81*2=1,782

Step 2 - Duddhawork



45*9=405

4*405=1,620

① $4 \times$  9

$SA = 4 \times (45\text{cm} \times 9\text{cm})$

$SA = 4 \times 405\text{cm}^2$

$SA = 1620\text{ cm}^2$

② $2 \times$

$SA = 2 \times (9\text{cm} \times 9\text{cm})$

$= 2 \times 81\text{ cm}^2$

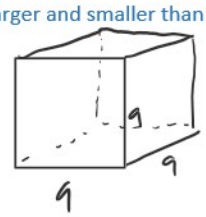
$= 162\text{ cm}^2$

③ TOTAL $SA = 1620\text{cm}^2 + 162\text{cm}^2$

$= 1782\text{ cm}^2$

Step 3 - Building Intuition

What is the total surface area of the 5 boxes if they were NOT connected? Do you expected the surface area to be larger and smaller than when the boxes are connected?



2430-8*81=1782

$SA = 6 \cdot (9\text{cm} \times 9\text{cm})$

6*81=486 $= 486\text{cm}^2$

TOTAL SA = 5*486=2,430 cm^2

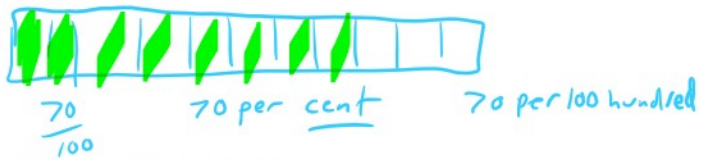
Question 36

Which of the following is equivalent to 70%?

- A ○ 0.07
- B ○ 70
- C ○ $\frac{1}{70}$
- D ● $\frac{7}{10}$

Step 1 - Stuff We Need to Know

✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy



Step 2 - Duddhawork

(A) $0.07 = \frac{7}{100} = 7\%$ ✗

(B) $70 = 70.0 = \frac{7000}{100} = 7000\%$ ✗

(C) $1/70 = 0.0143$ ✗

(D) $\frac{7}{10} = 0.7 = \frac{70}{100} = 70\%$

Step 3 - Building Intuition

Question 37

An amusement park charges an entrance fee and a cost per ride as shown in the table.
Each ride costs the same amount.

Number of rides	Total cost ($)
n = 3	T = 15
n = 9	T = 27

What is the cost per ride?

- A $2
- B $3
- C $5
- D $9

grade 10 sub elim

Step 1 - Stuff We Need to Know

- ✓ Solving linear systems by substitution | Algebra Basics | Khan Academy
- ✓ Solving systems of equations by elimination | Algebra Basics | Khan Academy

$T = f + nc$

$10 + 3(5) = 10 + 15 = 25\$$

Step 2 - Duddhawork

T: Total cost, c: cost/ride
f: Entrance fee.
n: number of rides

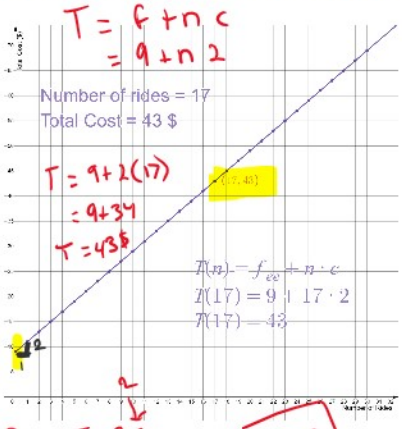
① $15 = f + 3c$

② $27 = f + 9c$

2 unknowns (f, c)
2 equations.
can solve ✓

Step 3 - Building Intuition

What is the entrance fee? How much would it cost for 17 rides?
https://www.desmos.com/calculator/vpwbhqge71



$T = f + nc$
$= 9 + n2$
$T = 9 + 2(17)$
$= 9 + 34$
$T = 43\$$
$f = 15 - 3c$
$= 15 - 3(2)$
$= 15 - 6$
$f = 9$

Elimination

Eliminate f

① − ②

$15 = f + 3c$
$27 = f + 9c$
$-12 = 0 - 6c$
$-12 = -6c$
$c = \frac{-12}{-6}$
$c = 2$

Substitution

Step 1: Solve for f in ①

① $15 = f + 3c$

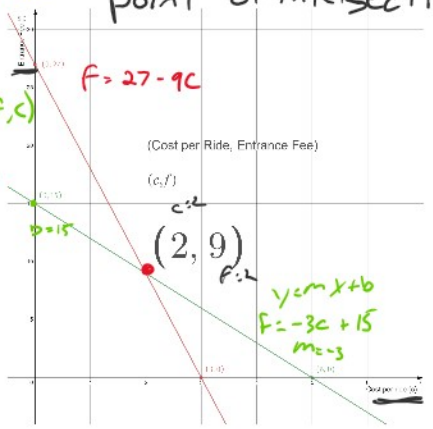
①* $f = 15 - 3c$

Step 2: Sub ①* in ②

② $27 = f + 9c$
$27 = (15 - 3c) + 9c$
$27 = 15 + 6c$
$12 = 6c$

$c = \frac{12}{6} = 2$

Point of intersection



https://www.desmos.com/calculator/po6e49xnub

Question 38

A rectangle is cut into fourths.
Each fourth is cut into 4 equal parts.

What fraction of the rectangle is each resulting part?

- A ○ one half
- B ○ one fourth
- C ○ one eighth
- D ● one sixteenth

Step 2 - Duddhawork

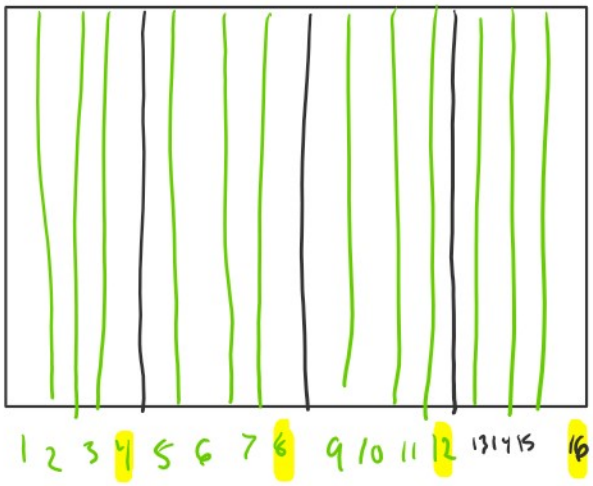
$$\frac{1}{4} \div \frac{4}{1} = \frac{1}{4} \times \frac{1}{4}$$

$$= \frac{1}{16}$$

Step 1 - Stuff We Need to Know

- ✓ Intro to equivalent fractions | Fractions | 4th grade | Khan Academy
- ✓ Understanding division of fractions | Fractions | Pre-Algebra | Khan Academy

Step 3 - Building Intuition



1/16

Question 39

During a trip to Europe, Raj pays 750 euros to purchase 3 paintings.
Each painting costs the same amount.
At the time of his purchase, Raj knows that 0.68 euros are equivalent to 1 Canadian dollar.

How much does each painting cost in Canadian dollars?

- A ○ $170.00
- B ○ $250.00
- C ● $367.65
- D ○ $1102.90

Step 1 - Stuff We Need to Know

✓ Currency Exchange Introduction

Step 2 - Duddhawork

Cost / painting Euros

① $\frac{750 \text{ Euros}}{3 \text{ paintings}} = 250 \frac{\text{Euros}}{\text{painting}}$

② Euros → CAD $

250/0.68=367.6471

$250 \frac{\text{Euros}}{\text{painting}} \times \frac{1 \text{ CAD\$}}{0.68 \text{ Euros}} = 367.6471 \frac{\$}{\text{painting}}$

Step 3 - Building Intuition

How much did Raj pay in total for the 3 painting in US dollars given that at the time, **1 US dollar is equivalent to 1.27 Canadian dollar**?

$\frac{750 \text{ Euro}}{\text{purchase}} \times \frac{1 \text{ CAD\$}}{0.68 \text{ Euro}} \times \frac{1 \text{ US \$}}{1.27 \text{ CAD\$}}$

$= \frac{750}{(0.68 \cdot 1.27)}$

750/(0.68*1.27)=868.4576

Raj paid 868.46 US $ in total for the 3 paintings.

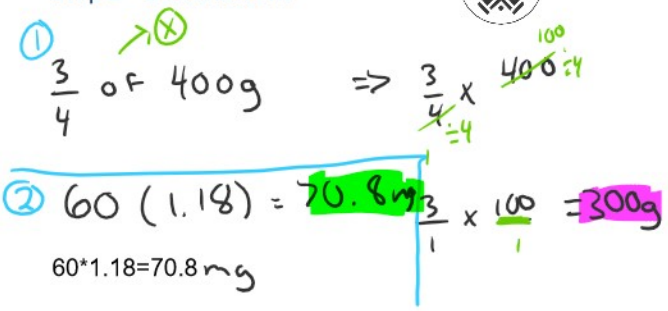
Question 40

A recipe calls for 400 g of onions and 60 mg of spices.
Olga changes the recipe.
She uses $\frac{3}{1}$ the amount of onions and she increases the amount of spices by 18%.

What quantities of onions and spices are in Olga's recipe?

- A ○ 100 g of onions and 10.8 mg of spices
- B ○ 100 g of onions and 49.2 mg of spices
- C ○ 300 g of onions and 60.18 mg of spices
- D ● 300 g of onions and 70.8 mg of spices

Step 2 - Duddhawork



Step 1 - Stuff We Need to Know

✓ Converting percent to decimal and fraction | Decimals | Pre-Algebra | Khan Academy

Step 3 - Building Intuition

What is the ratio of onions to spice in this recipe?

Onions : spice.

400g : 60 mg

400 000 : 60

mille = 1000

400 g x 1000 mg / 1 g

= 400 000 mg

÷2 400 000 / 60 = 20 000 / 3

÷2

Question 41

Which of the following expressions is equivalent to $(72 + 120) \div 12$?

A ○ $(120 + 12) \div 72$

B ○ $72 + 12 + 84 + 12$

C ● $72 \div 12 + 120 \div 12$

D ○ $120 + 12 \div (72 + 12)$

Step 1 - Stuff We Need to Know

✓ Introduction to order of operations | Arithmetic properties | Pre-Algebra | Khan Academy

B E D M A S

Distributive Property

$a(x+y) = ax + ay$

Step 2 - Duddhawork

$(72+120) \div 12 = 192 \div 12 = 16$

$(72+120) \div 12 = \frac{72}{12} + \frac{120}{12}$

$= 6 + 10 = 16$

Step 3 - Building Intuition

(72+120)/12=16

A (120+12)/12=11

B 72+12+84+12=180

C 72/12+120/12=16

D 120+12/(72+12)=120.1429

Question 42

Which number is between 7.129 and 7.156?

- A ○ 7.12
- B ○ 7.16
- C ● 7.141
- D ○ 7.157

Step 1 - Stuff We Need to Know

✓ Comparing two decimal numbers using a number line (example) | Decimals | Pre-Algebra | Khan Academy

Step 3 - Building Intuition

https://www.desmos.com/calculator/obydxyooe9

Step 2 - Duddhawork

(1) which one is bigger?

7.129×1000 | 7.156×1000

7129 | 7156

$7.129 < x < 7.156$

(A) $7.120 < 7.129$ ✗

(B) $7.160 > 7.156$ ✗

(C) $7.129 < 7.141 < 7.156$ ✓

(D) $7.157 > 7.156$

Question 43

Which of the following expressions is equal to 51?

A ○ $6 + (18 \div 3) - 1 \times 5$ ✗

B ● $6 + 18 \div (3 - 1) \times 5$

C ○ $(6 + 18) \div 3 - 1 \times 5$

D ○ $6 + 18 \div 3 - 1 \times 5$

Step 1 - Stuff We Need to Know

✓ [Order of operations example | Arithmetic properties | Pre-Algebra | Khan Academy]

B Brackets
E Exponent
D M Division/Mult
A S Add/Sub
Left to Right

Step 3 - Building Intuition

https://www.desmos.com/calculator/5eul3gkbgy

$6 + \left(\frac{18}{3}\right) - 1 \cdot 5$ = 7

$6 + \frac{18}{(3-1)} \cdot 5$ = 51

$\frac{(6+18)}{3} - 1 \cdot 5$ = 3

$6 + \frac{18}{3} - 1 \cdot 5$ = 7

Step 2 - Duddhawork

(A) $6+(18\div3)-1\times5 = 6+(6)-1\times5$

$= 6+6-5 = 12-5 = 7 \neq 51$ ✗

(B) $6+18\div(3-1)\times5 = 6+18\div(2)\times5$

$= 6+9\times5 = 6+45 = 51$ ✓

(C) $(6+18)\div3-1\times5 = 24\div3-1\times5$ ✗

$= 8-1\times5 = 8-5 = 3$

(D) $6+18\div3-1\times5 = 6+6-1\cdot5$

$= 6+6-5 = 12-5 = 7$ ✗

Question 44

Which number **is not** less than 752 928?

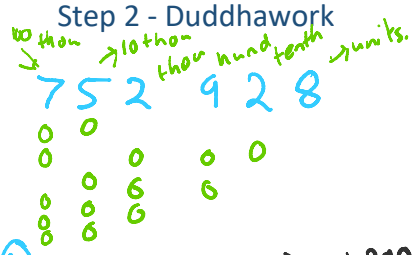
≥ 752 928

- A 752 931
- B 752 919
- C 749 989
- D 749 941

Step 1 - Stuff We Need to Know

✓ [Comparing multi-digit numbers | Math | 4th grade | Khan Academy]

Step 2 - Duddhawork



A) 700 000 + 50000 + 2000 + 900 + 30 + ... more (30 > 20)

B) 700 000 + 50000 + 2000 + 900 + 10 + ... less (10 < 10)

C) 700000 + 49000 + ... less

D) 700000 + 49000 + ... less

Step 3 - Building Intuition

R with Rstudio

```
> # A
> 752931 < 752928
[1] FALSE
>
> # B
> 752919 < 752928
[1] TRUE
>
> # C
> 749989 < 752928
[1] TRUE
>
> # D
> 749941 < 752928
[1] TRUE
```

Not less ✓