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DynaNotes™ Student Course Notes

Grade 7 Math

DYNA NOTES™

TOOLS FOR EXPLOSIVE LEARNING

Category 1 – Numerical Representations & Relationships

SETS AND SUBSETS OF RATIONAL NUMBERS

rational numbers ($\frac{a}{b}$, b ≠ 0) | integers {…−3, −2, −1, 0, 1, 2, 3, …} | whole numbers {0, 1, 2, 3, 4, …} | counting numbers {1, 2, 3, 4, …}

+, − fractional values (e.g., $-\frac{5}{3}$, $-\frac{1}{10}$, 0.1, 0.3, $\frac{4}{7}$) | negative integers {…, −4, −3, −2, −1} | zero {0}

Examples: Compare integers and rational numbers and show integer −2 is a ratio.

→ Rational numbers include any value that can be expressed as a ratio, including integers. Integers are a type of rational number that does not include fractional parts. $-2 = -\frac{2}{1}$

To which sets and subsets of numbers do $-\frac{21}{7}$ and 3.125125… belong?

→ $-\frac{21}{7}$ is rational; it simplifies to −3, so it is a negative integer

→ 3.125125… is a repeating decimal, so it is rational (a fractional value)

Proof it is a ratio: 1000(3.125125…) − 1(3.125125…) = (1,000 − 1)(3.125125…)

3,125.125125… − 3.125125… = 3,122 = 999(3.125125…) → *so*, 3.125125… = $\frac{3122}{999}$

OUTCOMES, EVENTS, AND PROBABILITIES

sample space: all possible outcomes for an **experiment** (action(s))

event: specific outcome(s); can be **simple** (1 step) or **compound** (>1 st…

Experiment	Type	Sample Space (can use lists or tree diag…
flip 1 coin	simple	*H*, *T* → where *H* = *heads* and *T* = *tails*
flip 1 coin 3 times	compound	*HHH, HHT, HTH, HTT, THH, THT, TTH, TTT* — *tree diagr… possible o… each step/ite… along each bran…*
flip 3 coins	simple	
roll 1 die	simple	*1, 2, 3, 4, 5, 6*
roll 1 die and flip 1 coin	compound	*1H, 1T, 2H, 2T, 3H, 3T, … 4H, 4T, 5H, 5T, 6H, 6T* … *systematic … list all*
spin the spinner twice and flip 1 coin	compound	

probability, *P*: likelihood that an … 30%

theoretical probability, P_{th}: predicte… varies from 0 (impossible) to 1 (certain…

Example: flip 1 coin, $P(T) = \frac{\text{event }(T)}{\text{possible }(T, H)} = \frac{1}{2}$ … chance … in 2

complement, *C*: probability of all outcomes oth… specified event; *C* = 1 − *P*   **Exa…** roll 1 die, $P(2,4) = \frac{2}{6}$, so … $\frac{2}{6} = \frac{4}{6} = \frac{2}{3}$

experimental prob… $\frac{\text{event}}{\text{\# of trials}}$ … data; varies from…

60 Rolls of … Die Results

Examples: Compa… probability of rolling … in 60 r… the theoretical probab…

$P_{exp}(2,4) = \frac{\text{event}}{\text{\# of trials}} = \frac{11+9}{…}$ …

$\frac{18}{60} < \frac{20}{60}$ … so, for this experim… $…(2,4) < P_{th}(2,4)$

…dents Student Survey … Results fr… 16 spins: {Y, B, Y, B, G, R, … B, B, Y, R, G, G, Y, R, B}. Compare actual results to the the…etical probabilities an…

…ected to ch… ue as thei… rimary…

$P_{th}(Y) = P_{th}(…) = P_{th}(G) = P_{th}(…$

predict … = 4 each; actual…

$P_{exp}(…) = \frac{…}{16} > \frac{1}{4}$; $P_{exp}(G) = P_{ex…}$

…plication law … ability: the theoretical probabil… or more e… multipli… together to find the prob… compou… …ne even… …ects the other, carefully…

Examples: … roll 1 die and flip 1 coin, what is the probability … odd number and heads? Compare … sample space: {1H, 1T, 2H, 2T, 3H, 3…, 4T, 5H, 5T, 6H, 6T} ← 3 possible out…

$P_{th}(odd) = \frac{3}{6}$ an…

$P_{th}(odd \& H) = …$

$P_{th} = \frac{\text{event (odd \& H)}}{\text{sample spac…}}$

Juan randomly draws 1 marble from a bag containing 8 re… 6 orange marbles. He puts the marble in his pocket and the… draws another 1 marble. What is the chance of his drawi… marbles? *Note: The 1st draw affects the sample space of the 2nd draw.*

$P_1(R) = \frac{8}{8+6+6} = \frac{8}{20}$ and $P_2(R) = \frac{8-1}{20-1} = \frac{7}{19}$ → $P(R \& R) = \frac{8}{20} \times \frac{7}{19} = \frac{2}{5} \times \frac{7}{19} = \frac{14}{…} = \frac{14}{95}$

Category 2 – Computations & Algebraic Relationships

PROPERTIES AND ORDER … ERATIONS

order of operations:

1. Groupings
2. Exponents
3. Multiply/Divide*
4. Add/Subtract*

**left to right*

Propert…	…of Addition	…of Multiplication
identit…	… + 0 = *a*	*a* • 1 = *a*
inve…	*a* + (−*a*)…	for *a* ≠ 0: $a \cdot \frac{1}{a} = 1$
co…	…e *a* + *b*…	ab…
as…	(*a* + *b*) + *c*…	…(*bc*)
distri…	–	…) = *ab* + *ac*

multiplying/dividing negative values: for *a* • *b* or *a* ÷ … ha… …me si… (+) or (− −) → (+) result; if signs are diffe… → (−) …

adding/subtracting negatives: *a* − *b* = *a* + … …ues P … and N < 0, if P > |N| … sum is positive; if |N| > P, the sum … egative … −*b*) = *a* + *b*

decim… … *b*, # decimal places in … duct = total … imal places in facto… decimal locatio… …ent is a… location in dividend, … right by … of decimal places in divisor

fractions: for … e sa… …r facto… …ove and below the … line, it can … is numerator ÷ denominator; … eciprocals… for +/… e common denominators

…	To	Conve… on Method
integ…	…ction	put integer over … minator 1 ($5 = \frac{5}{1}$; $-3 = \frac{-3}{1} = -\frac{3}{1}$)
dec…	…action	digits to right of decimal point / decimal's smallest place value (0.006 = $\frac{6}{1000}$; 2.15 = $2\frac{15}{100}$)
f…	decimal	divide; … ($\frac{15}{5}$ = 15 ÷ 3 = 5; $\frac{3}{5}$ = 0.6)
…n	equivalent fraction	multiply … both numerator and denominator by the same … nzero number …
…	…proper …tion	co… integer to equivalent fraction with same … minator as fraction part; add …
improp…	mixed numb…	… to find the quotient (whole part); fractional part is remainder over divisor ($\frac{7}{2}$ → 2)7 → 3 R 1 = $3\frac{1}{2}$)
percent	dec…	divide by 100; drop % sign (100% = 1; 350% = 3.5)
…cimal	percent	multiply by 100; add % sign (2.15 = 215%; 0.006 = 0.6%)

…nchmark percents/decimals/fractions: memorize common values

1%	10%	…%	25%	30%	$33\frac{1}{3}$%	40%	50%	60%	$66\frac{2}{3}$%	70%	75%	80%	90%	100%
0.01	…	0.2	0.25	0.3	0.3	0.4	0.5	0.6	0.6	0.7	0.75	0.8	0.9	1

…mple: An anchor is attached by a … …ain to Al's boat at $1\frac{1}{4}$ m below the surface. A red button lets out 2.3 m of chain. A blue button takes up 1.95 m of chain. What is the anchor's position if Al presses the red button 14 times and the blue button twice?

→ starting position: $-1\frac{1}{4}$ = −1.25 m

→ P_{final} = −1.25 − 14(2.3) + 2(1.95)

14 × 2.3 = 42 + 280 = 32.2; 1.95 × 2 = 3.90; 1.25 + 32.20 = 33.45; 33.45 − 3.90 = 29.55 — *align decimals*

Answer: P_{final} = −1.25 − 32.2 + 3.9 = −33.45 + 3.9 = −29.55 m

CONSTANT RATE OF CHANGE IN PROPORTIONS

A proportional relationship (output = constant • input, *y* = *mx*, *y* = *ax*, *y* = *kx*, *d* = *rt*) has a proportionality constant or constant rate of change (*m*, *a*, *k*, or *r*) equal to $\frac{y}{x}$ for any ordered pair (*x*, *y*); units of *x* and *y* can be the same or different.

Examples: $k = \frac{1\text{ ft}}{12\text{ in.}}$; $k = \frac{12\text{ boys}}{2\text{ girls}}$; $r = \frac{122\text{ miles}}{…\text{ hours}}$ … $= \frac{61\text{ mi}}{1\text{ hr}}$

…2.6 mi, …er lap. …mi/lap

…*d* vs. *t* … 1.5 … (hr)

…hour …els 25 …km (speed is $\frac{25\text{ km}}{1\text{ hr}}$).

bike's distance, *d*, changes with time, *t*.

0.5 1 1.5 time (hr)

1 → 25; 2 → 50 (×25)

Equation: *d* = 25*t*

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Symbol indicates section aligns to Texas College and Career Readiness Standards.