2nd Semester Final Exam Pretest

Integrated Math I

Unit 5: Real World Applications

Solve each question. Round your answer to the nearest hundredth when needed.

1) Working alone, it takes Mary 11 hours to clean an attic. Gabriella can clean the same attic in 15 hours. Find how long it would take them if they worked together.

6.35 hours

2) A cruise ship left Miami and traveled to Puerto Plata at an average speed of 5km/h. A fishing boat left sometime later traveling in the opposite direction with an average speed of 30 km/h. After the cruise ship had traveled for four hours the ships were 50 km apart. Find the number of hours the fishing boat traveled.

1 hour

3) An Air Force plane left London flying west three hours before a cargo plane. The cargo plane flew in the opposite direction going 205 km/h faster than the Air Force plane for seven hours after which time the planes were 5090 km apart. What was the Air Force plane's speed?

215 Km/h

4) Jasmine asked you to make 14 L of fruit juice that contains 55% fruit juice by mixing together with some Sweet Tropical Fruit Punch and some grape juice. How much of each ingredient do you need if the Sweet Tropical Fruit Punch contains 30% juice?

9L fruit punch

5L grape juice

5) Find the value of two numbers if their sum is 25 and their difference is 1

12 and 13

6) Carlos and Kim are selling cookie dough for a school fundraiser. Customers can buy packages of chocolate chip cookie dough and packages of oatmeal cookie dough. Carlos sold 5 packages of chocolate chip cookie dough and 10 packages of oatmeal cookie dough for a total of $180. Kim sold 9 packages of chocolate chip cookie dough and 5 packages of oatmeal cookie dough for a total of $142. What is the cost each of one package of chocolate chip cookie dough and one package of oatmeal cookie dough?

$8 per package of chocolate chip cookie dough
$14 per package of oatmeal cookie dough.

7) Eugene and Eduardo each improved their yards by planting daylilies and ornamental grass. They bought their supplies from the same store. Eugene spent $22 on 1 daylily and 8 bunches of ornamental grass. Eduardo spent $50 on 5 daylilies and 10 bunches of ornamental grass. What is the cost of one daylily and the cost of one bunch of ornamental grass?

$6 per daylily
$2 per bunch of ornamental grass

8) Jaidee's school is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 6 senior citizen tickets and 12 student tickets for a total of $144. The school took in $198 on the second day by selling 13 senior citizen tickets and 7 student tickets. What is the price each of one senior citizen ticket and one student ticket?

$12 per senior citizen ticket
$6 per student ticket

9) The senior classes at HAHS and Milford planned separate trips to the state fair. The senior class at HAHS rented and filled 11 vans and 4 buses with 312 students. Milford rented and filled 12 vans and 1 bus with 226 students. Every van had the same number of students in it as did the busses. How many students can a van carry? How many students can a bus carry?

16 students per van
34 students per bus

10) Nicole spent $44 on shirts. Tee shirts cost $4 and long sleeve shirts cost $10. If she bought a total of 8, then how many of each kind did she buy?

6 Tee Shirts
2 Long Sleeve Shirts

11) Kim's Printing Inc. has two type of printing presses: Model A and Model B. Model A can print 60 books per day and Model B can print 50 books per day. Altogether Kim has 18 printing presses. If she can print 990 books in a day, then how many of each press does she have?

9 Model A Presses
9 Model B Presses

12) Flying to San Diego with a tailwind a plane averaged 287 km/h. On the return trip the plane only averaged 225 km/h while flying back into the same wind. Find the speed of the plane in still air and the speed of the wind.

256 km/h for the Plane
31 km/h for the Wind

13) A plane traveled 1716 miles each way to Washington DC and back. The trip there was with the wind. It took 13 hours. The trip back was into the wind. The trip back took 22 hours. Find the speed of the plane in still air and the speed of the wind.

105 mph for the Plane
27 mph for the Wind

Unit 6: Arithmetic Sequences

Determine if the sequence is arithmetic. If it is, then find the common difference.

14) -36, -43, -50, -57, ...	15) -12, 188, 388, 588, ...
Arithmetic; $d = -7$	Arithmetic; $d = 200$

Find the specified formula for each of the given arithmetic sequences:

16) Recursive Formula for -7, -4, -1, 2, ...	17) Explicit Formula for 14, 21, 28, 35, ...
$a_1 = -7$ $a_n = a_{n-1} + 3$	$a_n = 7n + 7$

Given the arithmetic sequence answer each of the following:

-40, -140, -240, -340, ...

18) Find the next three terms	19) Find a_{30}	20) Find a_{52}
-440 -540 -640	-2940	-5140

Find the missing term or terms in each arithmetic sequence.

21) ..., 20, ____, 60, ... 40
22) ..., 23, ____, ____, 44, ... 30, 37
23) ..., 30, ____, ____, ____, 70, ... 40, 50, 60
24) ..., -15, ____, ____, ____, ____, 35... -5, 5, 15, 25
25) ..., -30, ____, ____, ____, ____, ____, -66, ... -36, -42, -48, -54, -60

Evaluate the related series of the sequence.

26) 37, 44, 51, 58, 65, 72, 79 406

Evaluate each arithmetic series described:

27) 18 + 25 + 32 + 39..., n = 18 1395
28) $\sum_{n=1}^{14}(10n - 17)$ 812
29) $a_1 = 15, d = 5, n = 11$ 440

Unit 7: Geometric Sequences

Determine if the sequence is geometric. If it is, then find the common ratio.

30) -4, -20, -100, -500, ...	31) 1, 5, 25, 125, ...
Geometric; $r = 5$	Geometric; $r = 5$

Find the specified formula for each of the given arithmetic sequences:

32) Recursive Formula for 1, -4, 16, -64, ...	33) Explicit Formula for 3, 9, 27, 81, ...
$a_1 = 1$ $a_n = -4 \cdot a_{n-1}$	$a_n = 3(3)^{n-1}$

Given the arithmetic sequence answer each of the following:

4, 8, 16, 32, ...

34) Find the next three terms	35) Find a_8	36) Find a_{10}
64 128 256	512	2048

Find the missing term or terms in each arithmetic sequence.

37) ..., 4, ____, 100, ... 20
38) ..., -3, ____, ____, -648, ... -18, -108
39) ..., 3, ____, ____, ____, 48, ... 6, 12, 24
40) ..., -3, ____, ____, ____, ____, -9375, ... -15, -75, -375, -1875
41) ..., 4, ____, ____, ____, ____, ____, 256, ... 8, 16, 32, 64, 128

Evaluate the related series of the sequence.

42. -3, 18, -108, 648, -3888

-3333

Evaluate each arithmetic series described:

43) $-2-6-18-54\ldots, n=9$

-19682

44) $\sum_{n=1}^{8}(-6)^{n-1}$

-239945

45) $a_1=2, a_8=-559872, r=-6$

-479890

Unit 8: Statistics

Find the mean, median, mode, minimum, maximum, and range.

46) Goals in a Hockey Game

5, 11, 3, 5, 7, 5, 9, 6, 3, 3, 9, 11, 3, 5, 7, 4, 5, 7, 5, 6, 12

order least to greatest: 3, 3, 3, 3, 4, 5, 5, 5, 5, 5, 5, 6, 6, 7, 7, 7, 9, 9, 11, 11, 12 (↑ min … ↑ max)

Mean	Median	Mode	Minimum	Maximum	Range
sum = 131, Total #'s = 21 6.24 Round 2 decimals	Middle # of data 5	Most Frequent # 5	3	12	max − min = 9

Draw a dot plot for each data set:

47) Age at First Job

14, 16, 13, 16, 16, 15, 21, 18, 16, 21, 19, 22, 18, 15, 17, 15, 13, 13, 17, 17, 16, 18, 17

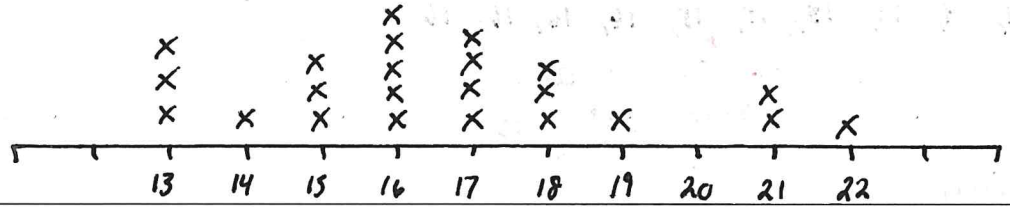
min = 13

max = 22

Range = max − min

= 22 − 13

= 9



Draw a stem-and-leaf plot for each data set:

48) Injuries Due to Distracted Driving per Month

6,811 9,498 4,771 8,376 9,443 7,829 5,921 5,050
4,296 6,380 9,877 7,634 8,114 9,666 4,375 8,139
8,958 8,822 7,415 12,049 10,306

Round to hundreds

6800	9700
4300	5900
9500	4400
6400	5100
4800	8100
9900	9000
8400	6800
7600	7400
9400	12000
8100	10300
7800	

Stem	Leaf
4	3, 4, 8
5	1, 9
6	4, 8
7	4, 6, 8
8	1, 1, 4, 8
9	0, 4, 5, 7, 9
10	3
11	
12	0

Key 4|3 = 4300

Draw a histogram for the data set:

49) Shoe Size

7.5 6.5 9 10 10 8 7.5 8.5 7 9 7.5 9
8 8.5 8.5 10 9.5 8.5 8 5.5 8 9.5

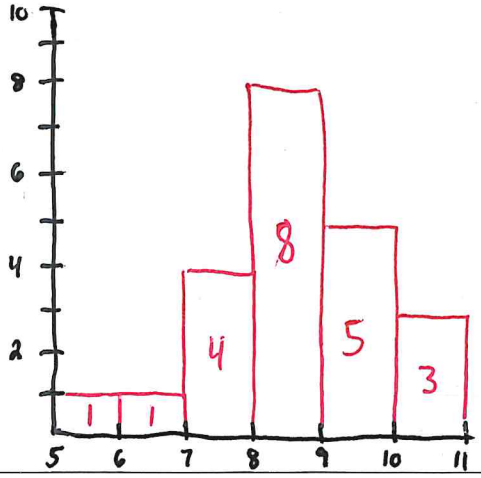
min = 5.5

max = 10

Range = max − min

= 10 − 5.5

= 4.5



Draw a box-and-whisker plot for each data set:

50) Age at First Job

17, 22, 16, 19, 15, 23, 17, 17, 16, 14, 16, 12, 14, 17, 15, 16, 18, 18, 15, 18, 22

Lower half of data (10 numbers)

12, 14, 14, 15, 15, 15, 16, 16, 16, 16

min

Lower Quartile Q1

$\frac{15+15}{2} = \frac{30}{2} = 15$

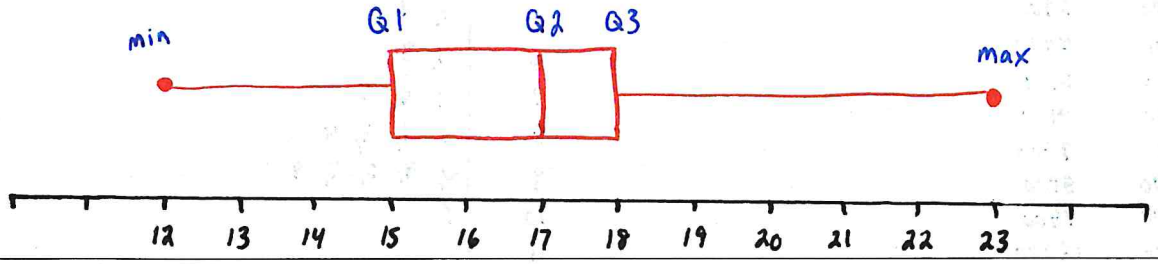
Median (Q2) = 17

Upper half of data (10 numbers)

17, 17, 17, 18, 18, 18, 19, 22, 22, 23 ← max

Upper Quartile Q3

$\frac{18+18}{2} = \frac{36}{2} = 18$



① Mary's Rate = $\frac{1 \text{ attic}}{11 \text{ hours}}$ Gabriella Rate = $\frac{1 \text{ attic}}{15 \text{ hours}}$

Together:

$$165\left[\frac{1}{11}t + \frac{1}{15}t = 1\right]165$$

$$15t + 11t = 165$$

$$\frac{26t}{26} = \frac{165}{26}$$

$$t = 6.3461538462$$

Nearest hundredth $\boxed{t = 6.35 \text{ hours}}$

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②

	R	· T	= D
Cruise Ship	5 km/h	4 hrs	20 km
Fishing Boat	30 km/h	t	30t

Opposite directions: Add distances (D) and equal to the total. Solve.

$$20 + 30t = 50$$
$$-20 \qquad -20$$

$$\frac{30t}{30} = \frac{30}{30}$$

$$\boxed{t = 1 \text{ hour}}$$

(3)

	R	• T	= D
Air Force	r	10 hrs	10r
Cargo Plane	r + 205	7 hrs	7(r+205)

Opposite Directions: Add directions and equal to total distance. Solve.

$$10r + 7(r+205) = 5090$$
$$10r + 7r + 1435 = 5090$$
$$17r + 1435 = 5090$$
$$-1435 \quad -1435$$
$$\frac{17r}{17} = \frac{3655}{17}$$

$$\boxed{r = 215 \text{ km/h}}$$

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(4) Mixture Equation $0.30x + 1.00y = 14(0.55)$

$0.30x + 1.00y = 7.7$

Amount Equation $x + y = 14$

Method 1: Substitution

- Solve amount Equation for x or y

$$x + y = 14$$
$$-y \quad -y$$
$$x = 14 - y$$

- Replace x in the mixture Equation. Solve for y

$$0.30x + 1.00y = 7.7$$
$$0.30(14-y) + y = 7.7$$
$$4.2 - 0.30y + y = 7.7$$
$$-4.2 \quad \text{combine } y\text{'s} \quad -4.2$$
$$\frac{0.7y}{0.7} = \frac{3.5}{0.7}$$

$$\boxed{y = 5}$$

- Replace y in amount equation and solve for x

$$x + y = 14$$
$$x + 5 = 14$$
$$-5 \quad -5$$
$$\boxed{x = 9}$$

Method 2: Elimination

- multiply Amount Equation by -1

$$-1(x + y = 14)$$
$$-x - y = -14$$

- Add to mixture Equation

$$0.30x + 1.00y = 7.7$$
$$-1x - 1y = -14$$
$$-0.7x = -6.3$$
$$\frac{-0.7x}{-0.7} = \frac{-6.3}{-0.7}$$

$$\boxed{x = 9}$$

- Replace x in Amount Equation. Solve for y

$$x + y = 14$$
$$9 + y = 14$$
$$-9 \quad -9$$
$$\boxed{y = 5}$$

9L Sweet Tropical Fruit Punch.
5L Grape Juice

⑤ Sum Equation $x + y = 25$

Difference Equation $x - y = 1$

- Perfect for elimination every time.
- Add and solve for x.

$$\frac{2x}{2} = \frac{26}{2}$$

$$\boxed{x = 13}$$

$x + y = 25$

$13 + y = 25$

$-13 \quad -13$

$$\boxed{y = 12}$$

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⑥ Carlos' Equation $5c + 10d = \$180$

Kim's Equation $9c + 5d = \$142$

Method 1: Substitution

- Solve Carlos' Equation for c

$5c + 10d = 180$

$-10d \quad -10d$

$$\frac{5c}{5} = \frac{180}{5} - \frac{10d}{5}$$

$c = 36 - 2d$

- Replace c in Kim's Equation & Solve for d.

$9c + 5d = 142$

$9(36 - 2d) + 5d = 142$

$324 - 18d + 5d = 142$

$324 - 13d = 142$

$-324 \quad -324$

$$\frac{-13d}{-13} = \frac{-182}{-13}$$

$$\boxed{d = \#14}$$

- Replace d in equation solve for c

$c = 36 - 2d$

$c = 36 - 2(14)$

$c = 36 - 28$

$$\boxed{c = \#8}$$

Method 2: Elimination

- Multiply Kim's Equation by -2

$-2(9c + 5d = 142)$

$-18c - 10d = -284$

- Add to Carlos' Equation

$5c + 10d = 180$

$-18c - 10d = -284$

$$\frac{-13c}{-13} = \frac{-104}{-13}$$

$$\boxed{c = \#8}$$

- Replace c in Carlos' Equation

$5c + 10d = 180$

$5(8) + 10d = 180$

$40 + 10d = 180$

$-40 \quad -40$

$$\frac{10d}{10} = \frac{140}{10}$$

$$\boxed{d = \#14}$$

$8 for Chocolate Chip Cookie Dough

$14 for Oatmeal Cookie Dough

⑦ Eugene's Equation $1d + 8g = 22$

Eduardo's Equation $5d + 10g = 50$

Method 1: Substitution

- Solve Eugene's Eqn for d.

$$1d + 8g = 22$$
$$-8g \quad -8g$$
$$1d = 22 - 8g$$

- Replace d in Eduardo's Equation

$$5d + 10g = 50$$
$$5(22 - 8g) + 10g = 50$$
$$110 - 40g + 10g = 50$$
$$110 - 30g = 50$$
$$-110 \quad -110$$
$$\frac{-30g}{-30} = \frac{-60}{-30}$$
$$\boxed{g = \$2}$$

- Plug into equation solved for d.

$$d = 22 - 8g$$
$$d = 22 - 8(2)$$
$$d = 22 - 16$$
$$\boxed{d = \$6}$$

Method 2: Elimination

- Divide Eduardo's Eqn by -5

$$\frac{5d}{-5} + \frac{10g}{-5} = \frac{50}{-5}$$
$$-d - 2g = -10$$

- Add to Eugene's Equation

$$1d + 8g = 22$$
$$+\,-d - 2g = -10$$
$$\frac{6g}{6} = \frac{12}{6}$$
$$\boxed{g = \$2}$$

- Plug into Eugene's Equation

$$d + 8g = 22$$
$$d + 8(2) = 22$$
$$d + 16 = 22$$
$$-16 \quad -16$$
$$\boxed{d = \$6}$$

$6 per daylily
$2 per bunch of ornamental grass

⑧ Day 1 Sales $6\$ + 12c = 144$

Day 2 Sales $13\$ + 7c = 198$

Method 1: Substitution

- Solve Day 1 for $\$$

$$6\$ + 12c = 144$$
$$-12c \quad -12c$$
$$\frac{6\$}{6} = \frac{144}{6} - \frac{12c}{6}$$
$$\$ = 24 - 2c$$

- Plug into Day 2 and solve for c

$$13\$ + 7c = 198$$
$$13(24 - 2c) + 7c = 198$$
$$312 - 26c + 7c = 198$$
$$312 - 19c = 198$$
$$-312 \quad -312$$
$$\frac{-19c}{-19} = \frac{-114}{-19}$$
$$c = \#6$$

- Plug into equation solved for $\$$

$$\$ = 24 - 2c$$
$$\$ = 24 - 2(6)$$
$$\$ = 24 - 12$$
$$\$ = \#12$$

Method 2: Elimination

- Divide Day 1 by 6

$$\frac{6\$}{6} + \frac{12c}{6} = \frac{144}{6}$$
$$\$ + 2c = 24$$

- Multiply by -13

$$-13(\$ + 2c = 24)$$
$$-13\$ - 26c = -312$$

- Add to Day 2 sales

$$13\$ + 7c = 198$$
$$-13\$ - 26c = -312$$
$$\frac{-19c}{-19} = \frac{-114}{-19}$$
$$c = \#6$$

- Plug into Day 1 Sales

$$6\$ + 12c = 144$$
$$6\$ + 12(6) = 144$$
$$6\$ + 72 = 144$$
$$-72 \quad -72$$
$$\frac{6\$}{6} = \frac{72}{6}$$
$$\$ = \#12$$

\#12 per Senior Citizen Ticket
\#6 per Student Ticket

(9) HAHS $11v + 4b = 312$

Milford $12v + 1b = 226$

Method 1: Substitution

- Solve Milford's Eqn for b.

$12v + 1b = 226$

$-12v \quad\quad -12v$

$1b = 226 - 12v$

- Replace in HAHS Eqn and solve for v.

$11v + 4b = 312$

$11v + 4(226 - 12v) = 312$

$11v + 904 - 48v = 312$

$-37v + 904 = 312$

$\quad\quad -904 \quad -904$

$\frac{-37v}{-37} = \frac{-592}{-37}$

$\boxed{v = 16}$

- Plug into equation solved for b.

$b = 226 - 12v$

$b = 226 - 12(16)$

$b = 226 - 192$

$\boxed{b = 34}$

Method 2: Elimination

- Multiply Milford by -4

$-4(12v + 1b = 226)$

$-48v - 4b = -904$

- Add to HAHS Equation

$11v + 4b = 312$

$-48v - 4b = -904$

$\frac{-37v}{-37} = \frac{-592}{-37}$

$\boxed{v = 16}$

- Plug into Milford Eqn and solve for b.

$12v + 1b = 226$

$12(16) + 1b = 226$

$192 + b = 226$

$-192 \quad\quad -192$

$\boxed{b = 34}$

16 passengers per van

34 passengers per bus

(10) Total Equation $t + \ell = 8$

Money Equation $4t + 10\ell = 44$

Method 1: Substitution

- Solve total Equation for t or ℓ

$$t + \ell = 8$$
$$-\ell \quad -\ell$$
$$t = 8 - \ell$$

- Substitute into Money Equation

$$4t + 10\ell = 44$$
$$4(8 - \ell) + 10\ell = 44$$
$$32 - 4\ell + 10\ell = 44$$
$$32 + 6\ell = 44$$
$$-32 \quad -32$$
$$\frac{6\ell}{6} = \frac{12}{6}$$
$$\boxed{\ell = 2}$$

- Plug into equation solved for t above

$$t = 8 - \ell$$
$$t = 8 - (2)$$
$$\boxed{t = 6}$$

Method 2: Elimination

- Multiply Total Equation by -4

$$-4(t + \ell = 8)$$
$$-4t - 4\ell = -32$$

- Add to Money Equation

$$4t + 10\ell = 44$$
$$-4t - 4\ell = -32$$
$$\frac{6\ell}{6} = \frac{12}{6}$$
$$\boxed{\ell = 2}$$

- Plug into Total Equation and solve for t.

$$t + \ell = 8$$
$$t + 2 = 8$$
$$-2 \quad -2$$
$$\boxed{t = 6}$$

6 Tee shirts
2 Long sleeve shirts

(11) Total Presses $A + B = 18$

Books Equation $60A + 50B = 990$

Method 1: Substitution

- Solve Total Presses for A or B

$$A + B = 18$$
$$-B \quad -B$$
$$A = 18 - B$$

- Replace in Books Equation and solve for B.

$$60A + 50B = 990$$
$$60(18 - B) + 50B = 990$$
$$1080 - 60B + 50B = 990$$
$$1080 - 10B = 990$$
$$-1080 \quad -1080$$
$$\frac{-10B}{-10} = \frac{-90}{-10}$$
$$\boxed{B = 9}$$

- Plug into Total Press Equation.

$$A + B = 18$$
$$A + 9 = 18$$
$$-9 \quad -9$$
$$\boxed{A = 9}$$

Method 2: Elimination

- Multiply Total Presses by -50

$$-50(A + B = 18)$$
$$-50A - 50B = -900$$

- Add to Books Equation and solve for A.

$$60A + 50B = 990$$
$$-50A - 50B = -900$$
$$\frac{10A}{10} = \frac{90}{10}$$
$$\boxed{A = 9}$$

- Plug into Total Press and solve for B.

$$A + B = 18$$
$$9 + B = 18$$
$$-9 \quad -9$$
$$\boxed{B = 9}$$

9 Model A Presses
9 Model B Presses

(12)

	R	· T	= D
To San Diego	r + c		
Back	r − c		

Dealing with only the rates we create 2 equations based on just those.

$$r + c = 287$$
$$r - c = 225$$

$$\frac{2r}{2} = \frac{512}{2}$$

$$r = 256 \text{ Km/h}$$

Using to San Diego

$r + c = 287$

$256 + c = 287$

$-256 \quad -256$

$c = 31$ Km/h

Plane Speed is 256 Km/h ; Wind Speed is 31 Km/h

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(13)

	R	· T	= D
To DC	r + c	13	1716
Return	r − c	22	1716

Equations

$13(r+c) = 1716$

$22(r-c) = 1716$

Divide each equation by the time and use elimination like above.

$$\frac{13(r+c)}{13} = \frac{1716}{13}$$

$$r + c = 132$$

$$\frac{22(r-c)}{22} = \frac{1716}{22}$$

$$r - c = 78$$

$$r + c = 132$$
$$r - c = 78$$

$$\frac{2r}{2} = \frac{210}{2}$$

$$r = 105 \text{ mph}$$

Using $r + c = 132$

$105 + c = 132$

$-105 \quad -105$

$c = 27$ mph

Plane Speed is 105 mph ; Wind speed is 27 mph

(14) $-43-(-36) = -43+36 = -7$
$-50-(-43) = -50+43 = -7$
$-57-(-50) = -57+50 = -7$
} All are the same.

Arithmetic Sequence with a common difference of -7

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(15) $188-(-12) = 188+12 = 200$
$388-(188) = 388-188 = 200$
$588-(388) = 588-388 = 200$
} All are the same.

Arithmetic Sequence with a Common Difference of 200

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(16) Let a_1 = First term
Let a_n = n^{th} term
Let a_{n-1} = $(n-1)^{th}$ term
Let d = common difference

Recursive Formula $a_n = a_{n-1} + d$

$a_n = a_{n-1} + 3$

$-4-(-7) = -4+7 = 3$
$-1-(-4) = -1+4 = 3$
$2-(-1) = 2+1 = 3$
} $d = 3$

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(17) Let n = term number
Let a_n = n^{th} term
Let d = common difference
Let b = constant

$21-14 = 7$
$28-21 = 7$
$35-28 = 7$
} $d = 7$

$a_n = 7n+7$

Explicit Formula

$a_n = d \cdot n + b$

using the first term:

$14 = 7(1) + b$
$14 = 7 + b$
$-7 \quad -7$
$7 = b$

(18) Let n = term number
Let a_n = Desired term
Let d = common difference
Let m = slope

$-140 - (-40) = -140 + 40 = -100$
$-240 - (-140) = -240 + 140 = -100$
$-340 - (-240) = -340 + 240 = -100$
$d = -100$

Next 3 terms:

$-340 - 100 = \boxed{-440}$
$-440 - 100 = -540$
$-540 - 100 = -640$

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(19) Using information from (18),

Explicit Formula
$a_n = d \cdot n + b$
using the first term:
$-40 = -100(1) + b$
$-40 = -100 + b$
$+100 \quad +100$
$60 = b$

$a_n = -100n + 60$
$a_{30} = -100(30) + 60$
$a_{30} = -3000 + 60$
$\boxed{a_{30} = -2940}$

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(20) Using the Explicit Formula above:

$a_{52} = -100(52) + 60$
$a_{52} = -5200 + 60$
$\boxed{a_{52} = -5140}$

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(21) ..., 20, ___, 60, ...
a_1 a_2 a_3

$a_2 = 20 + (2-1)(20)$
$a_2 = 20 + 1(20)$
$a_2 = 20 + 20$
$\boxed{a_2 = 40}$

$a_n = a_1 + (n-1) \cdot d$
$60 = 20 + (3-1) \cdot d$
$60 = 20 + 2d$
$-20 \quad -20$
$\frac{40}{2} = \frac{2d}{2}$
$20 = d$

(22) $\ldots, \underset{a_1}{23}, \underset{a_2}{\_\_}, \underset{a_3}{\_\_}, \underset{a_4}{44}, \ldots$

$a_2 = 23 + 7 = \boxed{30}$

$a_3 = 30 + 7 = \boxed{37}$

$a_n = a_1 + (n-1)\cdot d$

$44 = 23 + (4-1)(d)$

$44 = 23 + 3d$

$-23 \quad -23$

$\frac{21}{3} = \frac{3d}{3}$

$7 = d$

---

(23) $\ldots, \underset{a_1}{30}, \underset{a_2}{\_\_}, \underset{a_3}{\_\_}, \underset{a_4}{\_\_}, \underset{a_5}{70}, \ldots$

$a_2 = 30 + 10 = \boxed{40}$

$a_3 = 40 + 10 = \boxed{50}$

$a_4 = 50 + 10 = \boxed{60}$

$a_n = a_1 + (n-1)\cdot d$

$70 = 30 + (5-1)(d)$

$70 = 30 + 4d$

$-30 \quad -30$

$\frac{40}{4} = \frac{4d}{4}$

$10 = d$

---

(24) $\ldots, \underset{a_1}{-15}, \underset{a_2}{\_\_}, \underset{a_3}{\_\_}, \underset{a_4}{\_\_}, \underset{a_5}{\_\_}, \underset{a_6}{35}, \ldots$

$a_2 = -15 + 10 = \boxed{-5}$

$a_3 = -5 + 10 = \boxed{5}$

$a_4 = 5 + 10 = \boxed{15}$

$a_5 = 15 + 10 = \boxed{25}$

$a_n = a_1 + (n-1)\cdot d$

$35 = -15 + (6-1)\cdot d$

$35 = -15 + 5d$

$+15 \quad +15$

$\frac{50}{5} = \frac{5d}{5}$

$10 = d$

---

(25) $\ldots, \underset{a_1}{-30}, \underset{a_2}{\_\_}, \underset{a_3}{\_\_}, \underset{a_4}{\_\_}, \underset{a_5}{\_\_}, \underset{a_6}{\_\_}, \underset{a_7}{-66}, \ldots$

$a_2 = -30 - 6 = \boxed{-36}$

$a_3 = -36 - 6 = \boxed{-42}$

$a_4 = -42 - 6 = \boxed{-48}$

$a_5 = -48 - 6 = \boxed{-54}$

$a_6 = -54 - 6 = \boxed{-60}$

$a_n = a_1 + (n-1)\cdot d$

$-66 = -30 + (7-1)\cdot d$

$-66 = -30 + 6d$

$+30 \quad +30$

$\frac{-36}{6} = \frac{6d}{6}$

$-6 = d$

---

(26) $37 + 44 + 51 + 58 + 65 + 72 + 79 = \boxed{406}$

(27) Information Needed:

$a_1 = 18$

$n = 18$

$d = 25 - 18 = 7$

$$S_n = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$$
$$= \frac{18}{2}(2(18) + (18-1) \cdot 7)$$
$$= 9(36 + (17)(7))$$
$$= 9(36 + 119)$$
$$= 9(155)$$
$$= \boxed{1395}$$

---

(28) Information Needed:

$d = 10$

$n = 14$

$a_1 = 10(1) - 17$
$= 10 - 17$
$= -7$

$$S_n = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$$
$$= \frac{14}{2}(2(-7) + (14-1) \cdot 10)$$
$$= 7(-14 + (13) \cdot 10)$$
$$= 7(-14 + 130)$$
$$= 7(116)$$
$$= \boxed{812}$$

---

(29) Information Needed/Given:

$a_1 = 15$

$d = 5$

$n = 11$

$$S_n = \frac{n}{2}(2 \cdot a_1 + (n-1) \cdot d)$$
$$= \frac{11}{2}(2 \cdot 15 + (11-1) \cdot 5)$$
$$= 5.5(30 + (10) \cdot 5)$$
$$= 5.5(30 + 50)$$
$$= 5.5(80)$$
$$= \boxed{440}$$

---

(30) $\frac{-20}{-4} = 5$ $\quad \frac{-100}{-20} = 5$ $\quad \frac{-500}{-100} = 5$

Since all equal the same number the sequence is geometric and $r = 5$ here.

(31) $\frac{5}{1} = 5$ $\quad \frac{25}{5} = 5$ $\quad \frac{125}{25} = 5$

Since all equal the same number the sequence is geometric and $r = 5$ here.

---

(32) Recursive Geometric Formula: $a_n = r \cdot a_{n-1}$

Also, identify the a_1

$r = \frac{-4}{1} = -4$ so $\boxed{a_n = -4a_{n-1}}$ with $\boxed{a_1 = 1}$

---

(33) Explicit Geometric Formula: $a_n = a_1 (r)^{n-1}$

$a_1 = 3$

$r = \frac{9}{3} = 3$

$\boxed{a_n = 3(3)^{n-1}}$

---

(34) 4, 8, 16, 32, $\underset{a_5}{\_\_}$, $\underset{a_6}{\_\_}$, $\underset{a_7}{\_\_}$ $\quad r = \frac{8}{4} = 2$

$a_5 = 32(2) = \boxed{64}$

$a_6 = 64(2) = \boxed{128}$

$a_7 = 128(2) = \boxed{256}$

---

(35) Explicit Formula: $a_n = a_1 (r)^{n-1}$

$a_n = 4(2)^{n-1}$

Using (34) $r = 2$; $a_1 = 4$

so $a_8 = 4(2)^{8-1}$

$a_8 = 4(2)^7$

$a_8 = 4(128)$

$\boxed{a_8 = 512}$

(36) Explicit Formula from (35) $a_n = 4(2)^{n-1}$

$a_{10} = 4(2)^{10-1}$

$a_{10} = 4(2)^9$

$a_{10} = 4(512)$

$\boxed{a_{10} = 2048}$

---

(37) ..., 4, ___, 100, ...
(a_1, a_2, a_3)

$a_2 = 4(5) = \boxed{20}$

$a_n = a_1(r)^{n-1}$

$100 = 4(r)^{3-1}$

$\frac{100}{4} = \frac{4(r)^2}{4}$

$\sqrt{25} = \sqrt{r^2}$

$5 = r$

---

(38) ..., -3, ___, ___, -648, ...
(a_1, a_2, a_3, a_4)

$a_2 = -3(6) = \boxed{-18}$

$a_3 = -18(6) = \boxed{-108}$

$a_n = a_1(r)^{n-1}$

$-648 = -3(r)^{4-1}$

$\frac{-648}{-3} = \frac{-3(r)^3}{-3}$

$\sqrt[3]{216} = \sqrt[3]{r^3}$

$6 = r$

---

(39) ..., 3, ___, ___, ___, 48, ...
(a_1, a_2, a_3, a_4, a_5)

$a_2 = 3(2) = \boxed{6}$

$a_3 = 6(2) = \boxed{12}$

$a_4 = 12(2) = \boxed{24}$

$a_n = a_1(r)^{n-1}$

$48 = 3(r)^{5-1}$

$\frac{48}{3} = \frac{3(r)^4}{3}$

$\sqrt[4]{16} = \sqrt[4]{r^4}$

$2 = r$

(40) $\ldots, \underset{a_1}{-3}, \underset{a_2}{\_\_}, \underset{a_3}{\_\_}, \underset{a_4}{\_\_}, \underset{a_5}{\_\_}, \underset{a_6}{-9375}, \ldots$

$a_2 = -3(5) = \boxed{-15}$

$a_3 = -15(5) = \boxed{-75}$

$a_4 = -75(5) = \boxed{-375}$

$a_5 = -375(5) = \boxed{-1875}$

$a_n = a_1 (r)^{n-1}$

$-9375 = -3(r)^{6-1}$

$\frac{-9375}{-3} = \frac{-3(r)^5}{-3}$

$\sqrt[5]{-3125} = \sqrt[5]{r^5}$

$5 = r$

---

(41) $\ldots, \underset{a_1}{4}, \underset{a_2}{\_\_}, \underset{a_3}{\_\_}, \underset{a_4}{\_\_}, \underset{a_5}{\_\_}, \underset{a_6}{\_\_}, \underset{a_7}{256}, \ldots$

$a_2 = 4(2) = \boxed{8}$

$a_3 = 8(2) = \boxed{16}$

$a_4 = 16(2) = \boxed{32}$

$a_5 = 32(2) = \boxed{64}$

$a_6 = 64(2) = \boxed{128}$

$a_n = a_1 (r)^{n-1}$

$256 = 4(r)^{7-1}$

$\frac{256}{4} = \frac{4(r)^6}{4}$

$\sqrt[6]{64} = \sqrt[6]{r^6}$

$2 = r$

---

(42) $-3 + 18 - 108 + 648 - 3888 = \boxed{-3333}$

---

(43) Summation Formula:

$a_1 = -2$

$n = 9$

$r = \frac{-6}{-2} = 3$

$S_n = \frac{a_1 (1 - r^n)}{1 - r}$

$= \frac{-2(1 - 3^9)}{1 - 3}$

$= \frac{-2(1 - 19683)}{-2}$

$= \frac{-2(-19682)}{-2}$

$= \frac{39364}{-2}$

$= \boxed{-19682}$

(44) Summation Formula: $S_n = \frac{a_1(1-r^n)}{1-r}$

$a_1 = 1$

$n = 8$

$r = -6$

$$= \frac{1(1-(-6)^8)}{1-(-6)}$$

$$= \frac{1(1-1679616)}{1+6}$$

$$= \frac{1(-1679615)}{7}$$

$$= \frac{-1679615}{7}$$

$$= \boxed{-239945}$$

---

(45) Summation Formula: $S_n = \frac{a_1 - a_n \cdot r}{1-r}$

$a_1 = 2$

$a_8 = -559872$

$r = -6$

$$= \frac{2-(-559872)(-6)}{1-(-6)}$$

$$= \frac{2-(3359232)}{1+6}$$

$$= \frac{-3359230}{7}$$

$$= \boxed{-479890}$$

(44) Summation Formula: