Jakarta International School
7th Grade

Name: SOLUTIONS

Date:

Practice Test - Black

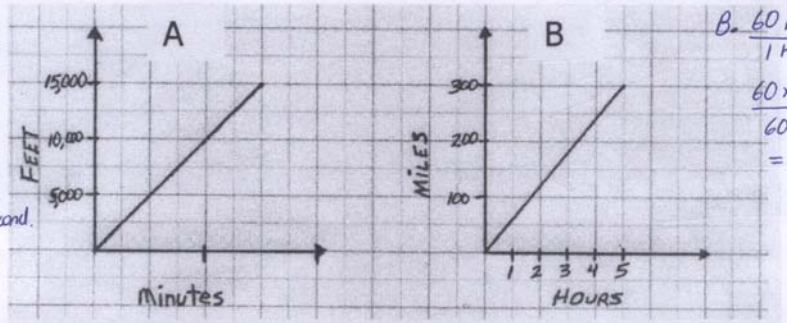
Ratios, Proportions, Percents and Probability

Score: $\frac{}{32}$

Clearly show required work. Check Carefully! (2 points per answer)

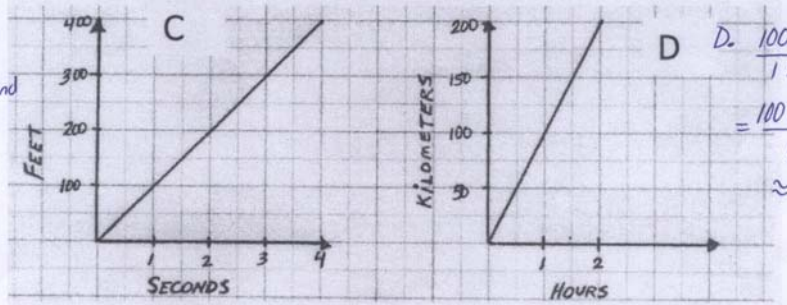
1. Each graph below represents a different car. Using the graphs, list the cars in order form fastest to slowest.

Use 1mile = 5280 feet 1 km = 0.62 miles 1 meter = 3.28 feet



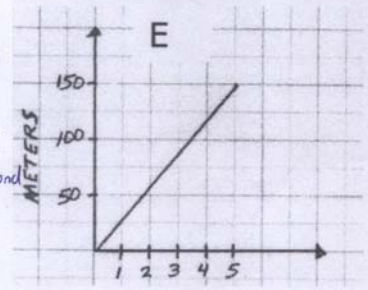
A. $\frac{10{,}000 \text{ feet}}{1 \text{ minute}} = \frac{10{,}000}{60} = 166.7 \text{ feet/second}$

B. $\frac{60 \text{ miles}}{1 \text{ hour}}$ $\frac{60 \times 5280}{60 \times 60} = 88 \text{ feet/second}$



C. 100 feet/second

D. $\frac{100 \text{ km}}{1 \text{ hr}} = \frac{100 \times .62 \times 5280}{60 \times 60} \approx 90.9 \text{ feet/sec}$



E. $\frac{30 \text{ meters}}{1 \text{ second}} = 30 \times 3.28 = 98.4 \text{ feet/second}$

Listing the speeds in order from fastest to slowest, we get

ACEDB

2. Seung Hee has turned into a superhero who can change his size whenever he wants to. Over the weekend, he changed his size several times. The ratio of his original height to his second height was 24 to 5. The ratio of his original height to his fourth height was 8 to 1. The ratio of his second height to his third height was 1 to 12. The tallest of these four heights was 240cm. What was his shortest height?

original height : 2nd height : 3rd height : 4th height

24 : 5 : 60 : 3

8 : 1 : 12 : 1

Tallest

24 : 5 : 60 : 3 → Shortest

96 : 20 : 240 : 12 → Shortest

Answer: 12 cm

3. Do En runs 8 miles in 62 minutes and 30 seconds. How fast was she running in km/hour?

Note : 5280 feet = 1 mile
12 inches = 1 foot
2.54 cm = 1 inch

$\frac{2.5 \text{ min}}{60} = \frac{25}{600} = \frac{1}{24}$

$8 \text{ miles} \times \frac{5280 \text{ ft}}{1 \text{ mile}} = 42240 \text{ feet}$

$42\,240 \text{ feet} \times \frac{12 \text{ inches}}{1 \text{ foot}} \times \frac{2.54 \text{ cm}}{1 \text{ inch}} = 1287475.2 \text{ cm} \div 100{,}000 = 12.87 \text{ km}$

$\frac{12.87 \text{ km}}{1\frac{1}{24} \text{ hour}} = \frac{x}{1 \text{ hour}} =$ **12.36 km/hour**

4. *Cereal stock Problem:* A supermarket's cereal shelves have room for 510 boxes of cereal. Sales figures show that Cheerios, Corn Flakes, and Raisin Bran sell in the ratio 5 : 3 : 9. How many boxes of each kind of cereal should be put on the shelves so that when the shelves are full the number of boxes will be in this ratio?

$5x + 3x + 9x = 510$

$17x = 510$

$x = 510 \div 17$

$x = 30$

Cheerios $- 5x = 150$ boxes

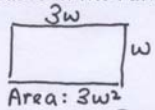
Corn Flakes $- 3x = 90$ boxes

Raisin Bran $- 9x = 270$ boxes.

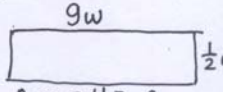
5. A rectangle is three times as a long as it is wide. The rectangle has it length increased in the ration of 3:1 and its width decreases in the ratio 1:2.

a. In what ratio is its area changed?

b. In what ratio is its perimeter changed?



Area: $3w^2$
Perimeter: $8w$



Area = $4.5w^2$
Perimeter: $19w$

a) ratio area changed: 1.5:1 = **3:2**

b) ratio perimeter changed: **19:8**

6. What makes a good random sample? Use the following situations to support your answer.

Situation A: You want to know how often teens rent videos. You plan to survey teens going into the local video rental store.
Situation B: You want to know the most popular breakfast cereal. You plan to survey every 5th person entering a grocery store.

In a good random sample, each member of the population has an equal chance of being selected. Situation A does not show a good random sample, as ~~s~~teens entering a video rental store may be more likely to rent videos than other teens.
Situation B does represent a good random sample as every fifth person entering a grocery store gives the cereal eating population an equal chance of selection.

7. Each student works at the same speed. If five students can complete a job in six days, how many days would it take three students to complete the same job?

If five students work for six days, that's 5 students x 6 days = 30 "student days". To complete the same job with just three students, it would take 30 student days ÷ 3 students = **10 days.**

8. *Photography:* A picture is enlarged by a scale factor of $\frac{5}{4}$ and then enlarged again by the same factor.

a. If the original picture was 2.5 inches by 4 inches, how large was it after both enlargements? $\times\frac{5}{4}$ $\times\frac{5}{4}$

1st enlargement → 3.125 inches by 5 inches
2nd enlargement → 3.90625 inches by 6.25 inches

b. By what scale factor was the original picture enlarged?

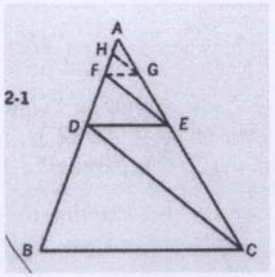
3.90625 is ? of 2.5

$3.90625 = 2.5x$

$x = 1.5625$ or $\frac{1.5625}{10000} = \frac{25}{16}$

9. In $\triangle ABC, \overline{DE} \parallel \overline{BC}, \overline{FE} \parallel \overline{DC}$ [redacted]

Find $\overline{DB}$ if $\overline{AF} = m_1$ and $\overline{FD} = m_2$



$\frac{AF}{FD} = \frac{AE}{EC}$

$\frac{m_1}{m_2} = \frac{AE}{EC}$

$\frac{AD}{DB} = \frac{AE}{EC}$

$\frac{m_1}{m_2} = \frac{AD}{DB}$

$\frac{m_1}{m_2} = \frac{m_1 + m_2}{DB}$

$DB = \frac{(m_1 + m_2)m_2}{m_1}$

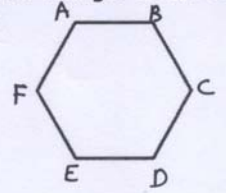
10. Four prime numbers are randomly selected without replacement from the first ten prime numbers. What is the probability that the sum of the four selected number is odd? Express your answer as a common fraction.

Of the first ten prime numbers (2,3,5,7,11,13,17,19, 23,29) nine of them are odd. The sum will be even if four odd numbers are selected, and the probability of that happening is $\frac{9}{10} \times \frac{8}{9} \times \frac{7}{8} \times \frac{6}{7} = \frac{6}{10} = \frac{3}{5}$ ∴ the probability that the sum is even is $\frac{2}{5}$.

11. Hyun Kyoo has one standard quarter and one special quarter with a head on both sides. He selects one of these two coins at random, and without looking at it first, he flips the coin three times. If he flips a Head three straight times, what is the probability that he selected the special quarter? Express your answer as a common fraction.

If he chooses the standard quarter: $\frac{1}{8}$ probability for HHH.
If he chooses the special quarter $\frac{8}{8}$ probability for HHH.
There are 9 ways of flipping 3 heads with both quarters. $\frac{8}{9}$ are with the special quarter. ($\frac{1}{9}$ is with standard quarter). → Answer.

12. From a regular hexagon, three vertices are selected at random. What is the probability that these three vertices form an equilateral triangle or an isosceles triangle? Express your answer as a common fraction.



Two equilateral triangles (ACE & BDF)
6 isosceles (ABC, BCD, CDE, DEF, EFA, FAB)

$\frac{8 \text{ triangles}}{20 \text{ possible triangles}} = \frac{2}{5}$

13. My calculator told me that 40.5405405% of the people asked if they used "Scrubbo" soap powder, replied 'yes'. What is the smallest number of people who could have responded, "yes" to the question?

$40.5405405\% = .40540540\overline{5} = .\overline{405} = \frac{405}{999} = \frac{135}{333} =$

$\frac{45}{111} = \frac{15}{37}$

The smallest number of people who could have responded "yes" is 15.

14. Angela saved $3200 of her salary and spent 40% on herself. She spent the rest of her salary on her family. If the amount of money she spent on her family was 20 % of the total amount of money she spent, find her salary.

Let x = Angela's salary

Saved: 3200

Spent on herself: $.40x$

Spent on her family: $x - 3200 - .40x$

$x - 3200 - .40x = .2(.40x + x - 3200 - .4x)$

$.6x - 3200 = .2x - 640$

$.4x = 2560$

$x = 6400$

Her salary is $6400

15. A rectangle has its length increased by 30% and its width decreased by 10%. What is the percentage increase or decrease in its area?

20 cm, 10 cm, $200 cm^2$ → 26 cm, 9 cm, $234 cm^2$

% decrease $= \frac{34}{200} = 0.17 =$ 17% decrease

16. A retailer bought 6 washing machines at the same cost price. He sold 2 of them at a 35% profit, 3 of them at a 20% profit and the last one at a 5% loss. If he received $4350 altogether, how much did he pay for each washing machine?

$2(1.35c) + 3(1.2c) + .95c = 4350$

$\frac{7.25c}{7.25} = \frac{4350}{7.25}$

$c = 600$

He paid $600 for each washing machine.