19. If Mark can mow the lawn in 40 minutes and Audrey can mow the lawn in 50 minutes, which equation can be used to determine how long it would take the two of them to mow the lawn together?

a. $\frac{40}{x} + \frac{50}{x} = 1$

b. $\frac{x}{40} + \frac{x}{50} = 1$

c. $\frac{1}{x} + \frac{1}{x} = 90$

d. $50x + 40x = 1$

e. $90x = \frac{1}{x}$

51. If $x:y = 5:2$ and $y:z = 3:2$, what is the ratio of $x:z$?

A. 3:1
B. 3:5
C. 5:3
D. 8:4
E. 15:4

4. The ratio of boys to girls in a kindergarten class is 4 to 5. If there are 18 students in the class, how many are boys?

f. 9

g. 8

h. 10

i. 7

j. 12

11. A cookie recipe calls for $\frac{2}{3}$ cup sugar to make 24 two-inch cookies. According to this recipe, how many cups of sugar should be used to make 60 two-inch cookies?

Ratio And Proportion

$\frac{2}{3}$ of $60 = 40$

$$\frac{\frac{2}{3}}{24} = \frac{x}{60}$$

A. $\frac{5}{9}$

B. 1

C. $1\frac{1}{5}$

→ D. $1\frac{2}{3}$

E. $3\frac{1}{6}$

$$\frac{40}{24} = \frac{\frac{2}{3} \cdot 60}{24} = x = \frac{40 \div 8}{24 \div 8} = \frac{5}{3} = 1\frac{2}{3}$$

18. A road map is drawn to scale so that 1.5 inches represents 90 miles. How many miles does 1.6 inches represent?

G

F. 91
G. 96
H. 99
J. 100
K. 106

DO YOUR FIGURING HERE.

Ratio and Proportion

$$\frac{1.5}{90} = \frac{1.6}{x} \Rightarrow x = \frac{90 * 1.6}{1.5} = 96$$

34. A truck sprang a leak at the bottom of its radiator, which held 480 ounces of fluid when it started to leak, and started losing radiator fluid at a constant rate of 4 ounces per minute. Suppose that the radiator continued to leak at this constant rate and that the truck, traveling at 35 miles per hour, could continue traveling at this rate until its radiator was completely empty. In how many *miles* would the radiator be empty?

F. 13.7
G. 17.5
H. 35.0
J. 70.0
K. 120.0

RATE PROBLEM COMBO

$\frac{480\ oz}{4\ oz/min} = 120\ min = 2\ hours$

$35\ mph \times 2\ hours = 70\ mi$

37. If Mark works steadily he can complete a task in x hours. What portion of the task remains if he works steadily for y hours, where y is any value less than x ?

DO YOUR FIGURING HERE.

Expressing changes Algebraicly The remaining portion will be expressed in terms of decimal or percent

E

A. $\frac{(x+y)}{x}$

B. $\frac{(y-x)}{x}$

C. $\frac{(x-y)}{(x+y)}$

D. $\frac{(x-y)}{y}$

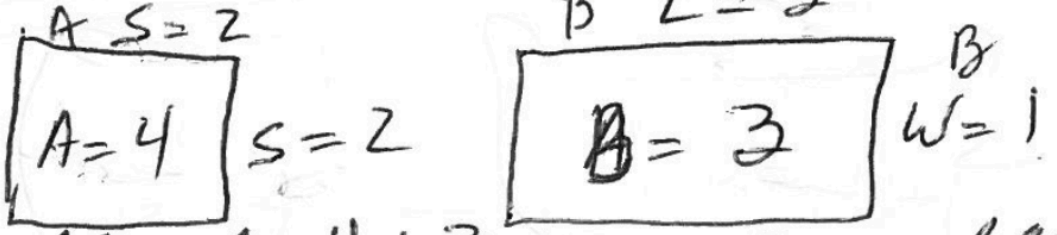
→ E. $\frac{(x-y)}{x}$

2 Ratio △ △ △ △ △ △ 2

28. The ratio of a side of square A to the length of rectangle B is 2:3. The ratio of a side of square A to the width of rectangle B is 2:1. What is the ratio of the area of square A to the area of rectangle B ?

F. 2:1
G. 3:1
H. 3:2
J. 4:1
→ K. 4:3

Diagram Helpful



AREA A 4 : 3 Area B

As long as S was 2 in both ratios, you can do this.

45. A 45-foot wire is cut into 2 pieces whose lengths are in the ratio 2:3. What is the length of the shorter piece, in feet?

C **A.** 9

B. 15

C. 18

D. $22\frac{1}{2}$

E. 30

with a 2:3 ratio, the shorter to the whole is $\frac{2}{2+3}$ or $\frac{2}{5}$

Set up Proportion to solve for 45 feet

$$\frac{2}{5} = \frac{x}{45}$$

$$x = [45(2)] \div 5 = 18$$

GO ON TO THE NEXT PAGE.

11. A recipe for 1 loaf of bread calls for $3\frac{3}{4}$ cups of flour. What is the maximum number of such loaves that can be made with a bag of flour that contains $12\frac{3}{8}$ cups of flour?

A. 3
B. 4
C. 9
D. 15
E. 16

A

Ratio and Proportion

$$\frac{1 \text{ loaf}}{3\,3/4} = \frac{x \text{ loaves}}{12\,3/8}$$

$x = 12\,3/8 \div 3\,3/4$

$= 12.375 \div 3.75 = 3.3$

You can estimate by Multiplying denominator by 4

Ratio and Probability

54. Only tenth-, eleventh-, and twelfth-grade students attend Washington High School. The ratio of tenth graders to the school's total student population is 86:255, and the ratio of eleventh graders to the school's total student population is 18:51. If 1 student is chosen at random from the entire school, which grade is that student most likely to be in?

G

F. Tenth
G. Eleventh
H. Twelfth
J. All grades are equally likely.
K. Cannot be determined from the given information

since $51 \div 5 = 255$, there are $18 \div 5 = 90$ in 11th grade

$86 + 90 + x = 255$

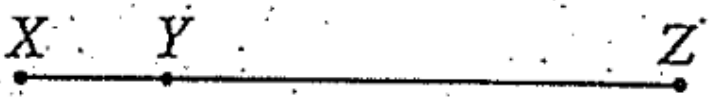
$x = 79$ or 12th

$\frac{86}{255}$ $\frac{90}{255}$ $\frac{79}{255}$

10th 11th 12th

the greatest chance is 11th because they have most

12. On the line segment below, the ratio of lengths XY to YZ is 1:3. What is the ratio of XY to XZ ?



F. 1:4
G. 1:2
H. 3:1
J. 4:1
K. Cannot be determined from the given information

E. 20

12. Carl is making a scale drawing of his rectangular bedroom floor. The floor is 12 feet wide by 14 feet long. He is using a scale of $\frac{1}{4}$ inch = 1 foot for the scale drawing of the floor. What will be the dimensions, in inches, of Carl's bedroom floor in the scale drawing?

→ F. 3 by $3\frac{1}{2}$

G. 4 by $4\frac{2}{3}$

H. 6 by 7

J. 36 by 42

K. 48 by 56

Scale Drawings
Use proportions, but
Make sure all your
Measurements are
consistent.

$$\frac{\frac{1}{4}}{1 \text{ foot}} = \frac{?}{12 \text{ feet}} \Rightarrow 12\left(\frac{1}{4}\right) = 1? \quad 3 = ?$$

The only
answer
with 3 is
F

K

30. Near a large city, planes take off from two airfields. One of the fields is capable of sending up a plane every 3 minutes. The other field is capable of sending up 2 planes every 7 minutes. At these rates, which of the following is the most reasonable estimate of the total number of planes the two airfields could send up in 90 minutes?

F. 18
G. 27
H. 36
J. 44
K. 55

$\frac{2}{7} = \frac{x}{90}$ $180 = 7x$ $25.7 = x$

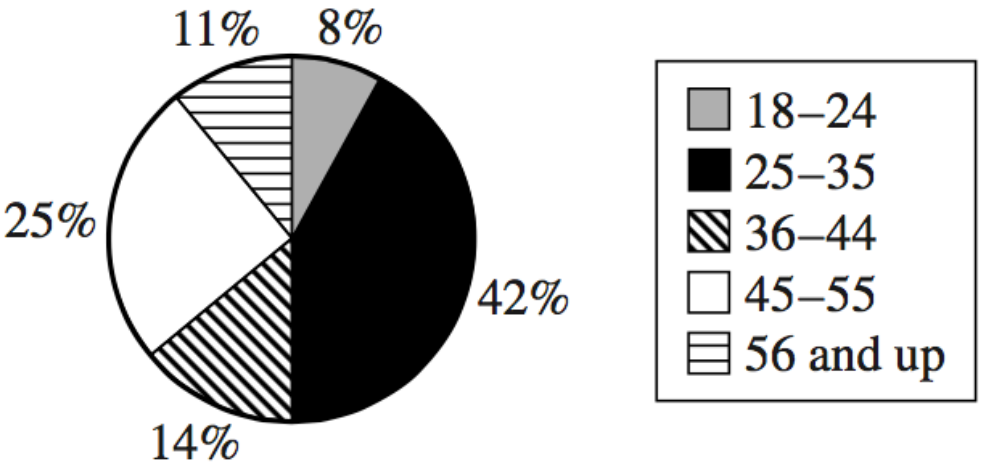
$\frac{1}{3} = \frac{y}{90}$ $30 = y$

FIND out how MANY PLANES EACH airFIELD CAN TAKE OFF in 90 minutes then ADD them together

Can't HAVE 0.7 of A PLANE $30 + 25 = 55$

43. The circle graph below shows the distribution of registered voters, by age, for a community. Registered voters are randomly selected from this distribution to be called for jury duty. What are the odds (in the age range:not in the age range) that the first person called for jury duty is in the age range of 25–35 years?

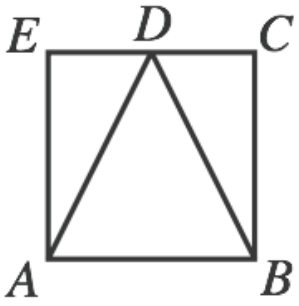
Distribution of Registered Voters by Age



A. 1:3
B. 7:8
C. 7:43
D. 21:29
E. 42:25

16. In square $ABCE$ shown below, D is the midpoint of $\overline{CE}$. Which of the following is the ratio of the area of $\triangle ADE$ to the area of $\triangle ADB$?

F. 1:1
G. 1:2
H. 1:3
J. 1:4
K. 1:8



... to c, what is a to c?

Example: $\frac{a}{b} = \frac{7}{3}$ and $\frac{b}{c} = \frac{2}{5}$, Find $\frac{a}{c}$

46. A container is $\frac{1}{8}$ full of water. After 10 cups of water are added, the container is $\frac{3}{4}$ full. What is the volume of the container, in cups?

F. $13\frac{1}{3}$

G. $13\frac{1}{2}$

H. 15

J. 16

K. 40

51. If $x:y = 5:2$ and $y:z = 3:2$, what is the ratio of $x:z$?

A. 3:1
B. 3:5
C. 5:3
D. 8:4
E. 15:4

54. A dog eats 7 cans of food in 3 days. At this rate, how many cans of food does the dog eat in $3 + d$ days?

F. $\frac{7}{3} + d$

G. $\frac{7}{3} + \frac{d}{3}$

H. $\frac{7}{3} + \frac{7}{3d}$

J. $7 + \frac{d}{3}$

K. $7 + \frac{7d}{3}$

46. A container is $\frac{1}{8}$ full of water. After 10 cups of water are added, the container is $\frac{3}{4}$ full. What is the volume of the container, in cups?

F. $13\frac{1}{3}$

G. $13\frac{1}{2}$

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34. A truck sprang a leak at the bottom of its radiator, which held 480 ounces of fluid when it started to leak, and started losing radiator fluid at a constant rate of 4 ounces per minute. Suppose that the radiator continued to leak at this constant rate and that the truck, traveling at 35 miles per hour, could continue traveling at this rate until its radiator was completely empty. In how many *miles* would the radiator be empty?

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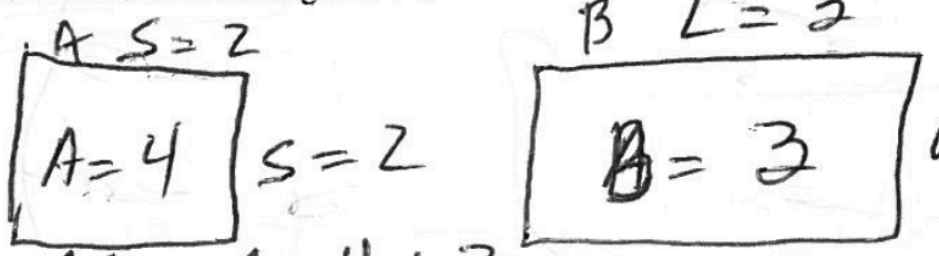

AREA A 4:3 Area B

As long as S was 2 in both ratios, you can do this.

46. During their morning jog in the park, Jean stops at a drinking fountain. Sula continues to jog and gets 10 meters ahead of Jean. Sula is jogging at a constant rate of 2 meters per second, and Jean starts jogging at a constant rate of 2.4 meters per second to catch up to Sula. Which of the following equations, when solved for t, gives the number of seconds Jean will take to catch up to Sula?

→ **F.** $2t + 10 = 2.4t$

G. $2t - 10 = 2.4t$

H. $\frac{10 + 2.4t}{2.4} = 2t$

J. $2t = 10$

K. $2.4t = 10$

DO YOUR FIGURING HERE.

Word problems and Rates

Distance equals rate times Time

When they meet up again, the time will be equal for both of them. Set the two formulas for the same distance equal to one another

17. Running at a steady pace of 90 seconds per quarter mile, how many minutes would it take to run 2 miles?

DO YOUR FIGURING HERE.

A. 12.0
B. 8.0
C. 7.2
D. 4.5
E. 3.0

Proportion → must have same corresponding units

$\frac{90 \text{ seconds}}{} = 1\frac{1}{2} \text{ min.}$

$\frac{1\frac{1}{2} \text{ min}}{\frac{1}{4} \text{ mile}} = \frac{x}{2 \text{ mile}} \Rightarrow 2\left(\frac{3}{2}\right) = \frac{x}{4} \Rightarrow 12 = x$

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B. 15

C. 18

D. $22\frac{1}{2}$

E. 30

with a 2:3 ratio, the shorter to the whole is $\frac{2}{2+3}$ or $\frac{2}{5}$

Set up Proportion to Solve for 45 feet

$\frac{2}{5} = \frac{x}{45}$

$x = [45(2)] \div 5 = 18$

GO ON TO THE NEXT PAGE.

9. Franco is riding in a seat on a Ferris wheel. The wheel rotates at a constant rate of 1 revolution every minute. What is the measure of the angle Franco's seat rotates around the center of the Ferris wheel, starting at the bottom, in $\frac{1}{2}$ minute?

A. $\frac{1}{2}°$
B. 1°
C. 90°
D. 180°
E. 360°

D

Cirles and Rates
If it takes one minute to make one revolution, then he goes half way around in 1/2 minute
If a full circle has 360°, then halfway would be 180°