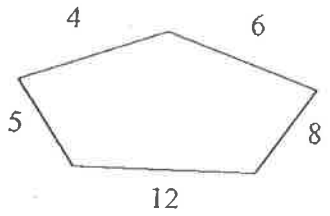
Key

5.1 NOTES - PERIMETER AND AREA

Perimeter

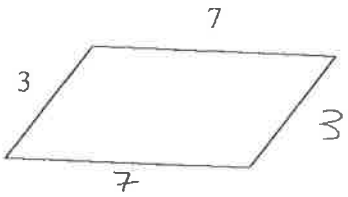
Perimeter is the distance around a figure

Find the perimeter of the figure



4+5+12+8+6=35 u

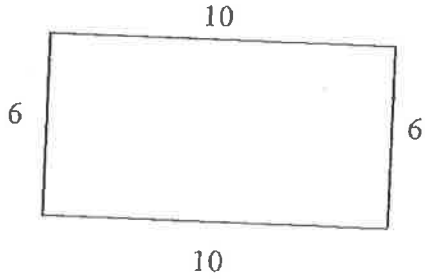
Find the perimeter of the parallelogram



3+7+3+7=20 u

The perimeter of a rectangle can also be found by the formula: $P = 2l + 2w$

Find the perimeter of the rectangle



Sum of the sides: 10 + 6 + 10 + 6 = 32

Formula:

$P = 2(10) + 2(6)$

$P = 20 + 12$

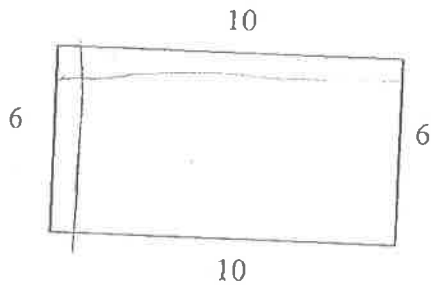
$P = 32$

Area

Area is the number of unit squares that fit into a large figure.

The area of a rectangle can also be found by the formula: $A = lw$

Find the area of rectangle ABCD



Sum of the unit squares: 60 u^2

Formula:

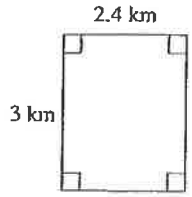
$A = lw$

$A = (10)(6)$

$A = (60)\ u^2$

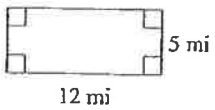
Find the area of each.

1)

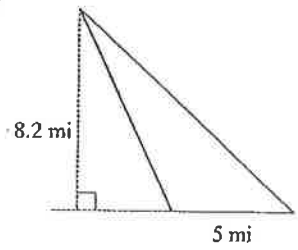


$A = lw$
$= (3)(2.4)$
$= 7.2 \text{ km}$

2)

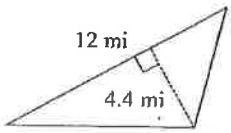


3)

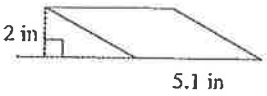


$A = \frac{1}{2}bh$
$= \frac{1}{2}(5)(8.2)$
$= 20.5 \text{ mi}$

4)

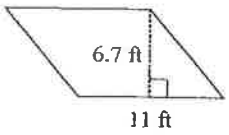


5)

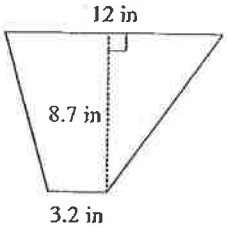


$A = bh$
$= (5.1)(2)$
$= 10.2 \text{ in}$

6)

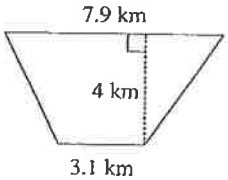


7)



$A = \frac{1}{2}h(a+b)$
$= \frac{1}{2}(8.7)(12+3.2)$
$= \frac{1}{2}(8.7)(15.2)$
$= 66.12$

8)



Key

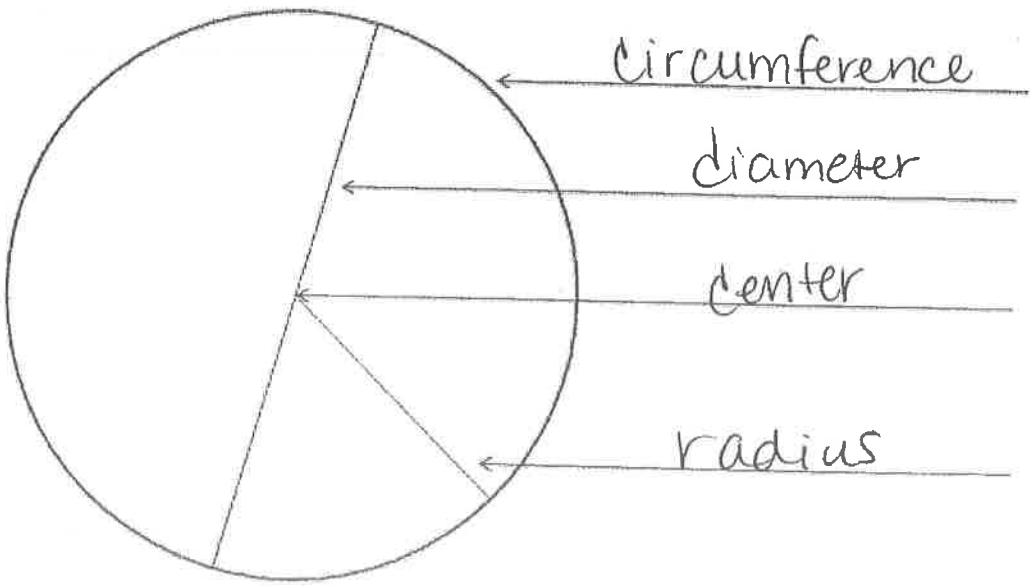
5.3 Circumference and Area of Circles

What is a circle? the set of points equidistant from a given point called the center

- The distance from the center to a point on the circle is called the radius
- Is a circle a polygon? no
- Why? no sides, no vertices

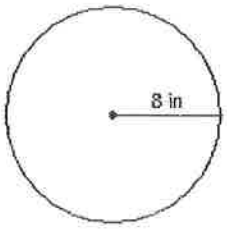
- Circumference is distance around a circle
- Circumference is equivalent to the ~~perimeter~~ of a polygon

Circle Diagram



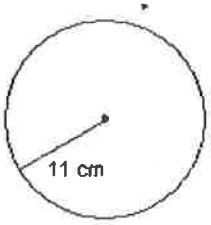
Find the circumference of the circle.

1)

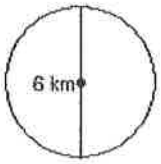


$C = 2\pi r$
$= 2\pi(8)$
$= 16\pi$

2)



3)

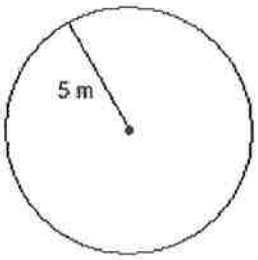


$d = 6$
$r = 3$

$C = 2\pi r$
$= 2\pi(3)$
$= 6\pi$

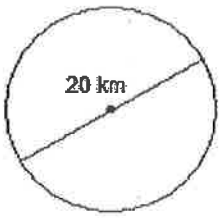
Find the area of the circle.

4)



$A = \pi r^2$
$= \pi(5)^2$
$= 25\pi$

5)



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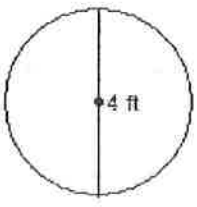
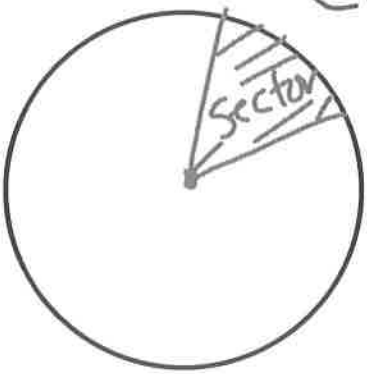


5.3 Add'l Sector Area 4/2/14

Sector: portion (slice) of the circle (pizza)



sector — degree measure

$$S_A = \frac{M}{360} \cdot \boxed{\pi r^2}$$

S_A: area; πr^2: area of circle

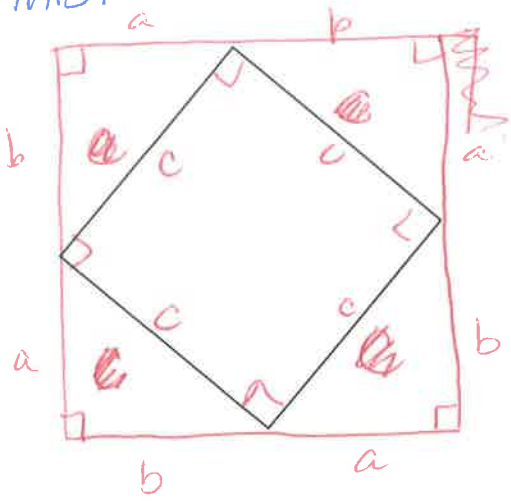
★ I do not have to memorize it ★

Key

5.4 THE PYTHAGOREAN THEOREM

Powerpoint goes with this!

Discovering the Pythagorean Theorem



1. Look at the square. Each of its sides is equal to "c" in length.

   What is the square's area? c^2

2. We're now going to encompass the square in a larger square. Note that each corner of the original square splits a segment in the larger square.

3. Label each section of the segments of the larger square with variables "a" and "b."

4. Look at the 4 triangles formed. What is the area of one triangle? $\frac{1}{2}ab$

   Since there are 4, what is the total area of the triangles? $2ab$

5. Note that the area of the larger square is equal to the area of the 4 triangles and the original square. What is the total area of the large square? c^2+2ab

6. The other way of finding the area of the large square is to take the product of the sides.

   What is the product of the sides? $(a+b)(a+b)$

7. Below, set the two ways to find the area of the large square equal to each other. Simplify the equation as much as possible. What do you find?

$$c^2+2ab=(a+b)(a+b)$$
$$c^2+2ab=a^2+ab+ab+b^2$$
$$c^2+2ab=a^2+2ab+b^2$$
$$-2ab \qquad -2ab$$
$$c^2=a^2+b^2$$

Your simplified result is the Pythagorean Theorem: $c^2=a^2+b^2$

Notes: The Pythagorean Theorem is only used on right triangles.
"c" is the variable given to the hypotenuse. "a" and "b" are for the legs.
The hypotenuse is the longest segment, found opposite of the 90° angle.

Pythagorean Inequalities

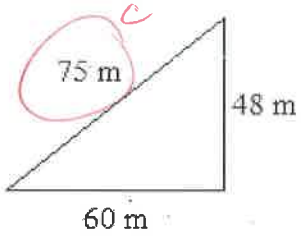
In addition to the Pythagorean Theorem, there are also 2 Pythagorean Inequalities.

For acute triangles: $c^2 < a^2 + b^2$

For obtuse triangles: $c^2 > a^2 + b^2$

State if each triangle is acute, obtuse, or right.

7)



c

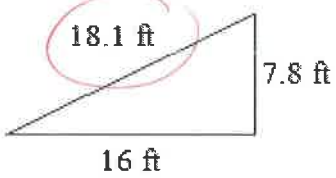
$75^2 \square 60^2 + 48^2$

$5625 \square 3600 + 2304$

$5625 \boxtimes 5904$

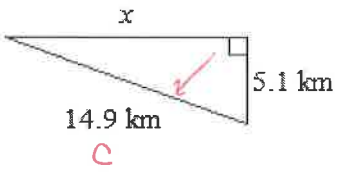
$<$ = acute

8) obtuse c



Find the missing side of each triangle. Round your answers to the nearest tenth if necessary.

9)



c

$x^2 + 5.1^2 = 14.9^2$

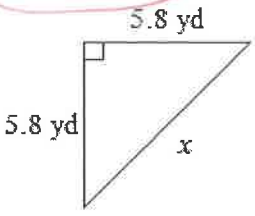
$x^2 + 26.01 = 222.01$

$-26.01 \quad -26.01$

$x^2 = 196$

$x = 14$ km

10) x = 8.2 yd



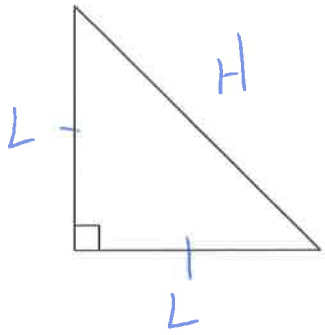
5.5 SPECIAL TRIANGLES

Key

45-45-90 Triangles

Theorem: For any 45-45-90 triangle, the length of the hypotenuse is $\sqrt{2}$ times the length of the leg.

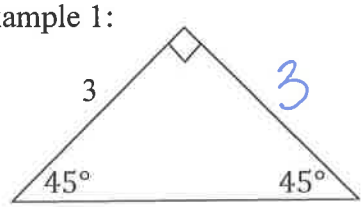
In general:



L → H	H → L
$L \cdot \sqrt{2}$	$\frac{H}{\sqrt{2}}$

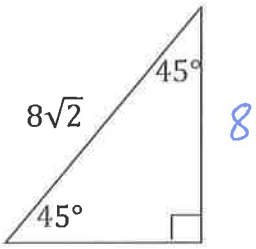
Use the theorem to find missing lengths:

Example 1:



$3\sqrt{2}$

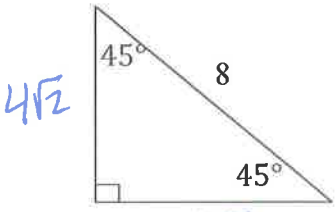
Example 2:



8

$\frac{8\sqrt{2}}{\sqrt{2}} = 8$

Example 3:

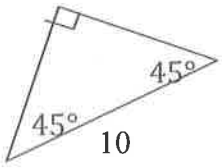


$4\sqrt{2}$

$4\sqrt{2}$

$\frac{8}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{8\sqrt{2}}{\sqrt{4}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2}$

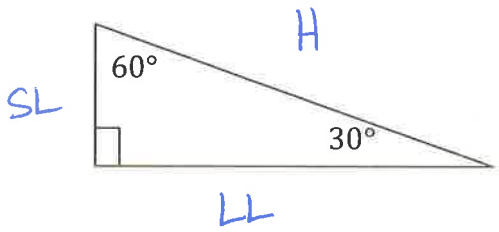
You try:



30-60-90 Triangles

Theorem: For any 30-60-90 triangle, the length of the hypotenuse is 2 times the length of the shortest leg.
For any 30-60-90 triangle, the length of the longest leg is $\sqrt{3}$ times the length of the shortest

In general:



SL→H: SL·2

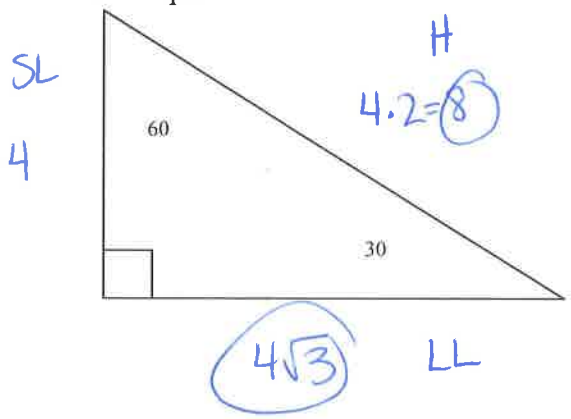
SL→LL: SL·$\sqrt{3}$

H→SL: $\frac{H}{2}$

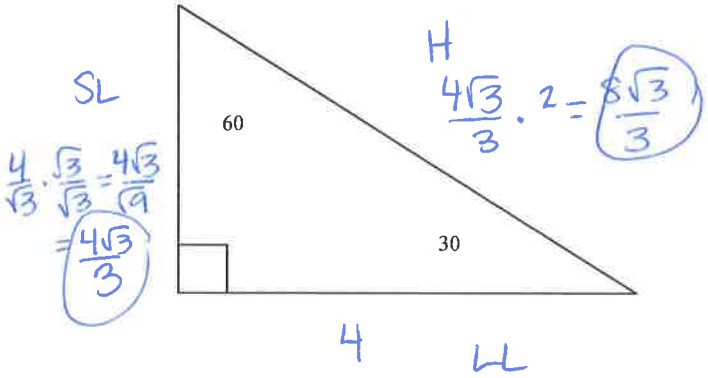
LL→SL: $\frac{LL}{\sqrt{3}}$

Use the theorem to find missing lengths:

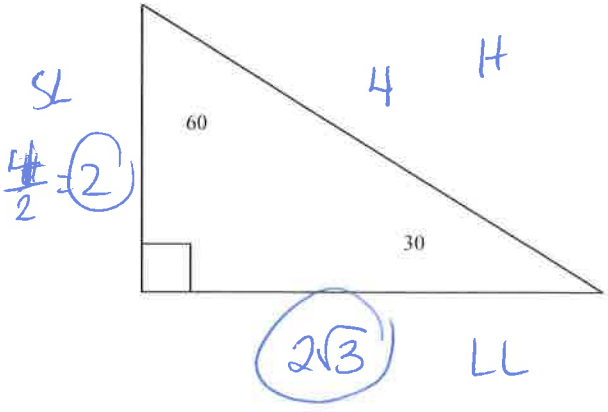
Example 4:



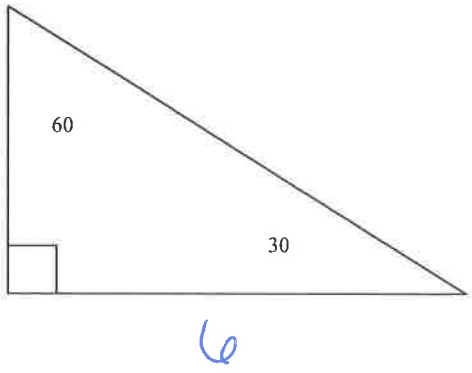
Example 5:



Example 6:



You try:



Key

Basic Square Root Ideas

1. A square root multiplied by a square root:
   - Multiply the insides of the square roots
   - Simplify if you can

$\sqrt{3} \cdot \sqrt{3} = \sqrt{9} = 3$

2. Dividing by a square root:
   - Bad Math 'grammar' to have $\sqrt{\ }$ in the denominator (the bottom)
   - Just multiply the top and bottom by the Same square root from the denominator
   - Multiply straight across the top and straight across the bottom
   - Simplify if you can

This is called "rationalizing the denominator"

Instead of $\frac{3}{\sqrt{2}}$ .....

$$\frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{3\sqrt{2}}{\sqrt{4}} = \frac{3\sqrt{2}}{2}$$

Find the missing side lengths. Leave your answers as radicals in simplest form.

1) $4\sqrt{2}$, 45°, b, a — $a=4$ $b=4$

2) 10, 45°, y, x — $x = 10\sqrt{2}$ $y=10$

3) n, 30°, m, $\sqrt{3}$ — $n=3$ $m=2\sqrt{3}$

4) y, 60°, x, $4\sqrt{3}$ — $x=8$ $y=4$

5) 8, 60°, y, x — $x = \frac{16\sqrt{3}}{3}$ $y = \frac{8\sqrt{3}}{3}$

6) 5, 60°, y, x — $x = \frac{10\sqrt{3}}{3}$ $y = \frac{5\sqrt{3}}{3}$

Mrs. Fucsko - Geometry

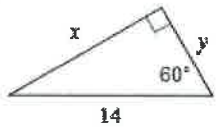
Name_____

Special Right Triangles Practice

Date_____

Find the missing side lengths. Leave your answers as radicals in simplest form.

1)



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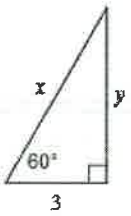

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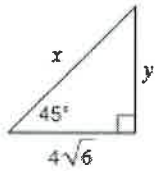

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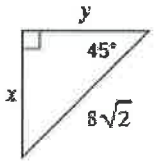

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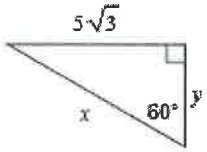

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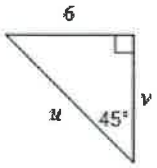

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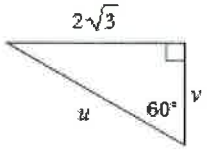
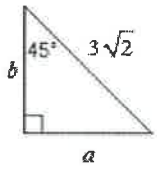
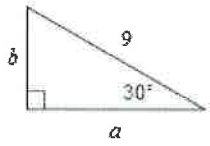


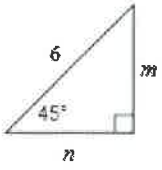
8)



9)

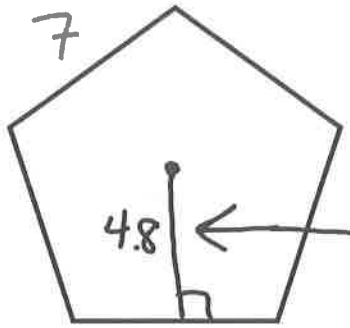


10)



5.5B Area of a regular polygon

☆ I have to memorize for the test ☆



In a regular polygon:

P = # of sides x side length

P = 5 x 7 = 35

$$A = \frac{1}{2}ap$$

$$A = \frac{1}{2}(4.8)(35)$$

$$A = 84 \text{ units}^2$$

Distance Formula

(x_1, y_1) (x_2, y_2)
$(-3, 4)$ $(5, -6)$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(5 + +3)^2 + (-6 - 4)^2}$$

$$d = \sqrt{(8)^2 + (-10)^2}$$ ☆

$$d = \sqrt{64 + 100}$$

$$d = \sqrt{164}$$

$d \approx 12.8$ units

Key

5.8 GEOMETRIC PROBABILITY

Probability Definitions

Formal Definition: The number from 0 to 1 that indicates how likely an event is to occur.
A probability of 0 (or 0%) indicates that the event cannot occur.
A probability of 1 (or 100%) indicates that the even must occur.

What we tend to use most is theoretical probability, which is written as a fraction.

Theoretical Probability = $\frac{\#\text{ of fav outcomes}}{\text{total \# of outcomes}}$

Finding Theoretical Probability

Rolling a die:

First determine how many possible outcomes there are:
A die has 6 sides, so there are 6 possible outcomes.

What is the probability of rolling a 5?
How many of the possible outcomes can be a roll of a 5? 1

The probability, then, for rolling a 5 is $\frac{1}{6}$

What is the probability of rolling an even number?
How many of the possible outcomes can be a roll of an even number? 3

The probability, then, for rolling an even number is $\frac{3}{6} = \frac{1}{2}$

Selecting from a deck of cards:

First determine how many possible outcomes there are:
There are 52 cards in a deck, so there are 52 possible outcomes.

What is the probability of drawing a club?
How many of the possible outcomes can be a draw of a club? 13

The probability, then, for drawing a club is $\frac{13}{52} = \frac{1}{4}$

What is the probability of drawing a jack?
How many of the possible outcomes can be a draw of a jack? 4

The probability, then, for drawing a jack is $\frac{4}{52} = \frac{1}{13}$

JQK

What is the probability of drawing a face card?
How many of the possible outcomes can be a draw of a face card? 12

The probability, then, for drawing a face card is $\frac{12}{52} = \frac{3}{13}$

5.8 Homework

Rolling a die.

1. Probability of rolling a 2 = $1/6$
2. Probability of rolling a number divisible by 3 = $2/6 = 1/3$
3. Probability of rolling an odd or even number = 1
4. Probability of rolling either a 5 or a 6 = $2/6 = 1/3$
5. Probability of rolling an 8 = 0
6. Probability of rolling an odd number = $3/6 = 1/2$
7. Probability of rolling a number less than or equal to 4 = $4/6 = 2/3$
8. Probability of rolling a 3 = $1/6$
9. Probability of rolling a number divisible by 2 = $3/6 = 1/2$
10. Probability of rolling a number greater than 4 = $2/6 = 1/3$

Drawing a card.

11. Probability of drawing a 7 = $4/52 = 1/13$
12. Probability of drawing a red card = $26/52 = 1/2$
13. Probability of drawing a jack, queen, king, or ace = $16/52 = 4/13$
14. Probability of drawing a 1 = 0
15. Probability of drawing an even card = $20/52 = 5/13$ 2 4 6 8 10
16. Probability of drawing an odd, black card = $8/52 = 2/13$ 3 5 7 9
17. Probability of drawing a spade = $13/52 = 1/4$
18. Probability of drawing a numbered card = $36/52 = 9/13$ 2 3 4 5 6 7 8 9 10
19. Probability of drawing a red card or an even card = $36/52 = 9/13$
20. Probability of drawing an card with a male face = $8/52 = 2/13$ J K

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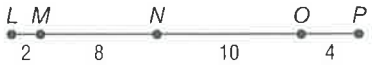
13-3 Skills Practice

Geometric Probability

Point X is chosen at random on $\overline{LP}$. Find the probability of each event.

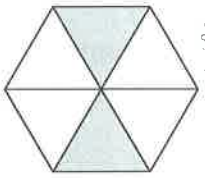
1. $P(X \text{ is on } \overline{LN})$ $\frac{10}{24} = \frac{5}{12}$

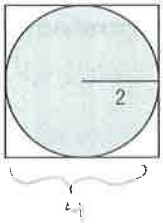


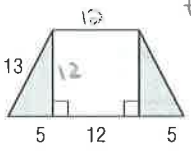
2. $P(X \text{ is on } \overline{MO})$ $\frac{18}{24} = \frac{3}{4}$

$5^2 + b^2 = 13^2$
$25 + b^2 = 169$
$b^2 = 144$
$b = 12$

Find the probability that a point chosen at random lies in the shaded region.

3.  $\frac{2}{6} = \frac{1}{3}$

4.  $\frac{4\pi}{16} = \frac{\pi}{4}$

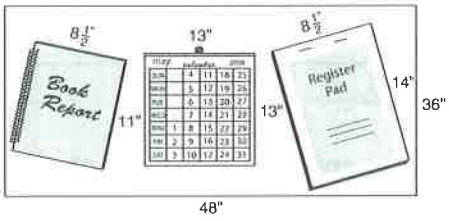
5. 

triangles: $\frac{1}{2}(5)(12) = 30 \times 2 = 60$

trapezoid: $\frac{1}{2}12(12+29) = 204$

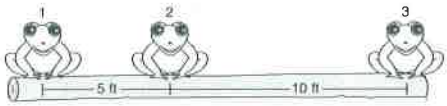
$\frac{60}{204} = \frac{5}{17}$

6. **DESKWORK** The diagram shows the top of a student's desk at home. A dart is dropped on the desk. What is the probability the dart lands on the book report?



Book report $8.5 \times 11 = 93.5$ desk $48 \times 36 = 1728$ $\frac{93.5}{1728} = \frac{187}{3456}$

7. **FROGS** Three frogs are sitting on a 15-foot log. The first two are spaced 5 feet apart and the third frog is 10 feet away from the second one. What is the probability that when a fourth frog hops onto the log it lands between the first two?



$\frac{5}{15} = \frac{1}{3}$

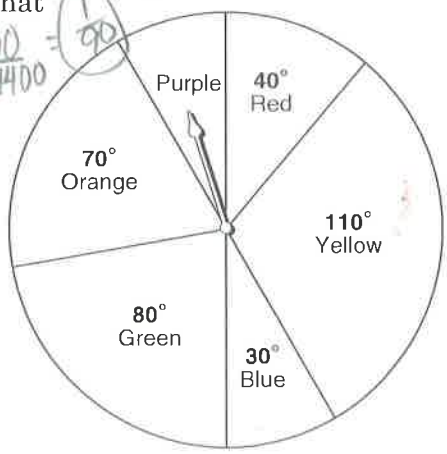
8. **RADIO CONTEST** A radio station is running a contest in which listeners call in when they hear a certain song. The song is 2 minutes 40 seconds long. The radio station promised to play it sometime between noon and 4 P.M. If you tune in to that radio station during that time period, what is the probability the song is playing?

song = 2 min 40 sec = 120 sec + 40 sec = 160 sec

noon – 4 pm = 4 hrs × 60 = 240 min × 60 = 14400 sec

$\frac{160}{14400} = \frac{1}{90}$

Use the spinner to find each probability. If the spinner lands on a line it is spun again.



9. $P(\text{pointer landing on yellow})$ $\frac{110}{360} = \frac{11}{36}$

10. $P(\text{pointer landing on orange})$ $\frac{70}{360} = \frac{7}{36}$

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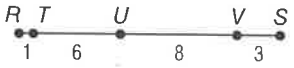
13-3 Practice

Geometric Probability

Point L is chosen at random on $\overline{RS}$. Find the probability of each event.



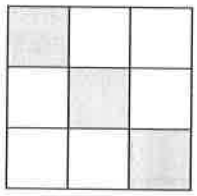
1. $P(L \text{ is on } \overline{TV})$ $\frac{14}{18} = \frac{7}{9}$

2. $P(L \text{ is on } \overline{US})$ $\frac{11}{18}$

$6^2 + b^2 = 12^2$
$36 + b^2 = 144$
$b^2 = 108$
$b = 10.4$

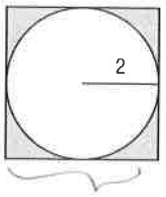
Find the probability that a point chosen at random lies in the shaded region. use 3.14 for π, round to nearest tenth

3.



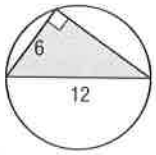
Shaded / whole $= \frac{3}{9} = \frac{1}{3}$

4.



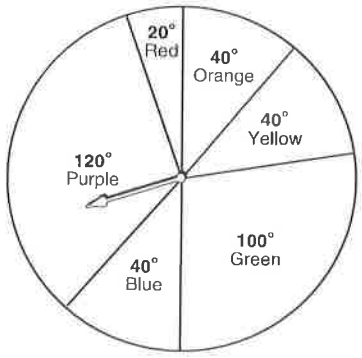
square = 16
circle = $\pi(2)^2$
4π
Shaded = $16 - 4\pi$
4
Shaded / whole $= \frac{16-4\pi}{16} = \frac{4-\pi}{4}$

5.



triangle: $A = \frac{1}{2}(6)(10.4) = 31.2$
circle: $\pi(6)^2 = 36\pi$
Shaded / whole $= \frac{31.2}{36\pi} = \frac{13}{15\pi}$

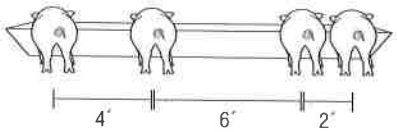
Use the spinner to find each probability. If the spinner lands on a line it is spun again.



6. $P(\text{pointer landing on purple})$ $\frac{120}{360} = \frac{1}{3}$

7. $P(\text{pointer landing on red})$ $\frac{20}{360} = \frac{1}{18}$

8. **PIGS** Four pigs are lined up at the feeding trough as shown in the picture. What is the probability that when a fifth pig comes to eat it lines up between the second and third pig?



$\frac{6}{12} = \frac{1}{2}$

9. **MUSIC** A certain company plays classical music when its customers are on hold on the telephone. If the length of the complete recording, Mozart's *Eine Kleine Nachtmusik* is 2 hours long, what is the probability a customer put on hold will hear the Allegro movement which is 6 minutes, 31 seconds long?

$6\frac{31}{60} = \frac{391}{60}$ min

$2 \text{ hrs} \times \frac{60 \text{ m}}{1 \text{ hr}} = 120 \text{ min}$

$\frac{\frac{391}{60}}{120} = \frac{391}{7200}$