SM2

END OF YEAR REVIEW
PART 1

PROBLEMS INVOLVING EXPONENTS

1-5) Perform the indicated operation

1) $-3x^{-3} \cdot 5x^5$ $-15x^2$

2) $y^{1/4} \cdot y^{1/3}$ $y^{7/12}$

3) $(4ab^2)^3$ $64a^3b^6$

4) $\frac{8x^8}{2x^2}$ $4x^6$

5) $2x^3 + x^3$ $3x^3$

6) Change to radical notation

6) $x^{3/4}$ $\sqrt[4]{x^3}$

7) change to exponential notation

7) $\sqrt[5]{x^6}$ $x^{6/5}$

PROBLEMS WITH POLYNOMIALS

8-10) FOIL

8) $(2x + 3)(x - 5)$

$2x^2 - 10x + 3x - 15$

$2x^2 - 7x - 15$

9) $(x + 10)(x - 10)$

$x^2 + 10x - 10x - 100$

$x^2 - 100$

10) $(y + 5)^3 =$ $(y+5)(y+5)(y+5)$

$(y+5)(y^2+10y+25)$

$y^3+10y^2+25y+5y^2+50y+125$

$y^3+15y^2+75y+125$

11-14) Factor completely

11) $12ax + 10ay + 8abz - 2a$ $2a(6x+5y+4bz-1)$

12) $x^3 - 9x$

$x(x^2-9)$

$x(x+3)(x-3)$

13) $x^2 - 11x + 10$ $(x-10)(x-1)$

14) $11x^2 + 22x - 88$

$11(x^2+2x-8)$

$11(x+4)(x-2)$

SOLVING QUADRATIC EQUATIONS

15-17) solve by factoring

15) $x^2 + 7x + 12 = 0$

$(x+4)(x+3) = 0$

$x = -4, x = -3$

16) $6x^2 - 21x = 0$

$3x(2x-7) = 0$

$x = 0, x = 3.5$

17) $x^2 - 15 = 2x$

$x^2 - 2x - 15 = 0$

$(x-5)(x+3) = 0$

$x = 5, x = -3$

18) Solve by completing the square

19) Solve using the quadratic formula

18) $x^2 - 8x - 10 = 0$

$x^2 - 8x + \underline{16} = 10 + \underline{16}$

$(x-4)^2 = 26$

$x - 4 = \pm\sqrt{26}$

$x = 4 \pm \sqrt{26}$

$x = 9.10, -1.10$

19) $x^2 + 7x - 60 = 0$

$a = 1,\ b = 7,\ c = -60$

$\frac{-7 \pm \sqrt{7^2 - 4(1)(-60)}}{2(1)} = \frac{-7 \pm \sqrt{289}}{2}$

$\frac{-7 \pm 17}{2} = \frac{10}{2} = 5$ or $-\frac{24}{2} = -12$

PARABOLA PROBLEMS

20-25) Given the parabola $y = (x - 3)^2 - 2$

Find 20) the vertex $(3, -2)$

21) the horizontal shift $3 \rightarrow$

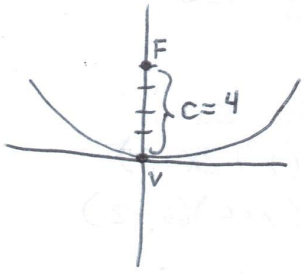
22) the vertical shift $2 \downarrow$

23) whether it opens up or down: up

24) the domain $(-\infty, \infty)$

25) the range $[-2, \infty)$

26 Find the equation of the parabola with the vertex at the origin and the focus (0,4)



$a = \frac{1}{4c} = \frac{1}{4 \cdot 4} = \frac{1}{16}$

$y = \frac{1}{16}x^2$

PROBLEMS WITH IMAGINARY NUMBERS

27-28 Perform the indicated operation & simplify

27) $(12 - 2i) + (-15 + 3i)$

$-3 + i$

28 $(3 + 5i)(5 - 4i)$

$15 - 12i + 25i - 20i^2$ (-1)

$15 + 13i + 20$

$35 + 13i$

SM2

END OF YEAR REVIEW
PART 2

1-5 MATCHING

Match the description of $\overline{XY}$ (or $\overrightarrow{XY}$ or $\overleftrightarrow{XY}$) with the matching illustration

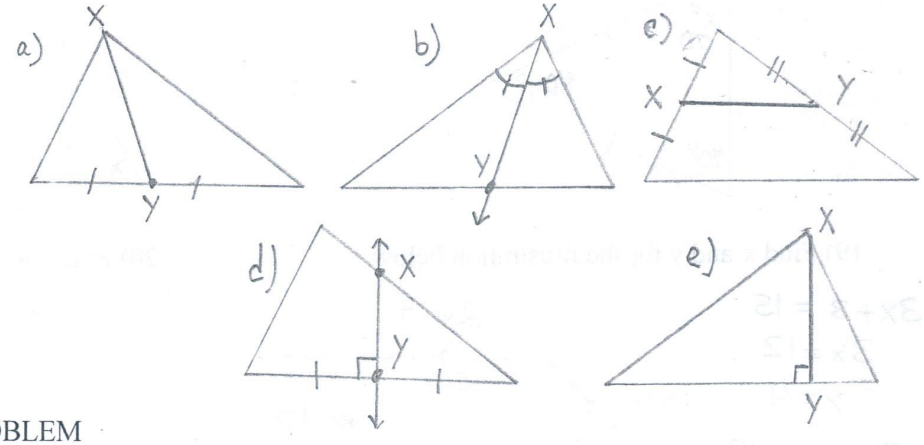
1) E altitude

2) A median

3) B angle bisector

4) D perpendicular bisector

5) C midsegment



6-9 ANOTHER MATCHING PROBLEM

answer bank: centroid, circumcenter, incenter, orthocenter

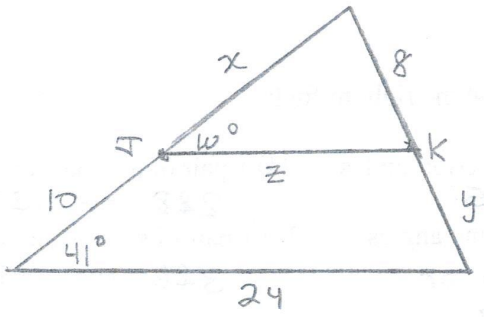
6) The point where the 3 medians meet is called the centroid

7) The point where the 3 angle bisectors meet is called the incenter

8) The point where the 3 altitudes meet is called the orthocenter

9) The point where the 3 perpendicular bisectors meet is called the circumcenter

10-13 Given midsegment $\overline{JK}$, find



10) x 10

11) y 8

12) z 12

13) w 41

14) Could the following be the sides of a triangle?
5, 10, 14 (Show why or why not)

Yes

5+10 = 15

15 > 14 ✓

15) Could the following be the sides of a triangle?
2, 7, 10 (show why or why not)

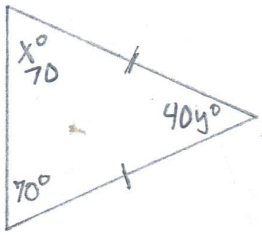
No

2+7 = 9

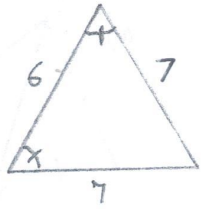
9 < 10 x

16) Two sides of a triangle are 5 and 8. The third side must be greater than 3 and less than 13.

17) Find x and y for the triangle below



18) Find the perimeter of the triangle below

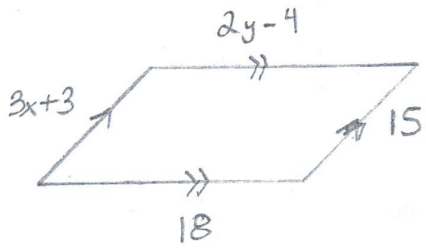


20

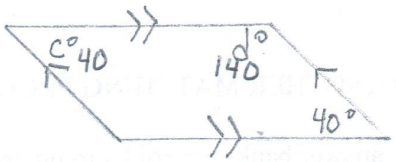
19) Find x and y for the illustration below

$3x+3 = 15$
$3x = 12$
$x = 4$

$2y-4 = 18$
$2y = 22$
$y = 11$



20) Find c and d for the illustration below



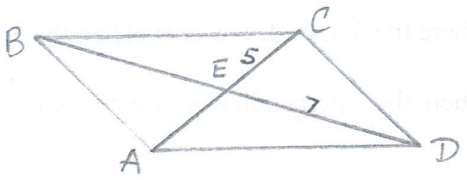
21-22) Use the parallelogram ABCD to answer the following

21) If DE = 7, find BE

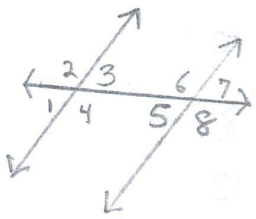
7

22) If CE= 5, find AC

10



23-26 Use the diagram on the right to find:



23) 1 pair of alternate interior angles

4 & 6 or 3 & 5

24) 1 pair of alternate exterior angles

2 & 8 or 1 & 7

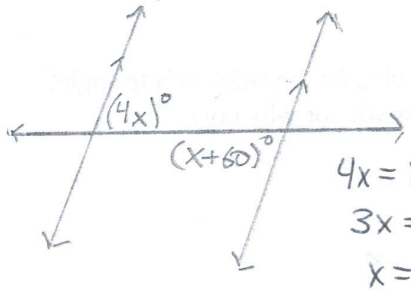
25) 1 pair of corresponding angles

1 & 5 or 2 & 6 or
4 & 8 or 3 & 7

26) 1 pair of same-side interior angles

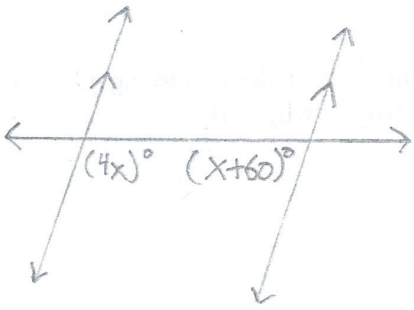
3 & 6 or 4 & 5

27) Solve for x



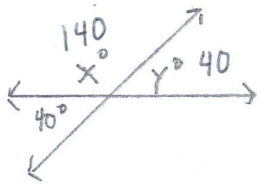
$4x = x+60$
$3x = 60$
$x = 20$

28) Solve for x

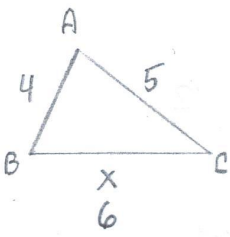


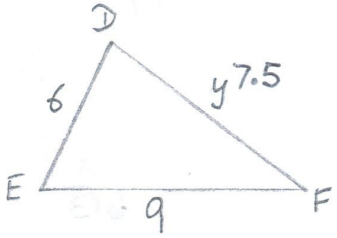
$4x+x+60 = 180$
$5x+60 = 180$
$5x = 120$
$x = 24$

28) Find x and y



29) Given $\triangle ABC \sim \triangle DEF$, find x and y. Then find the scale factor





$\frac{4}{6} = \frac{x}{9}$

$36 = 6x \rightarrow x = 6$

$\frac{4}{6} = \frac{5}{y}$

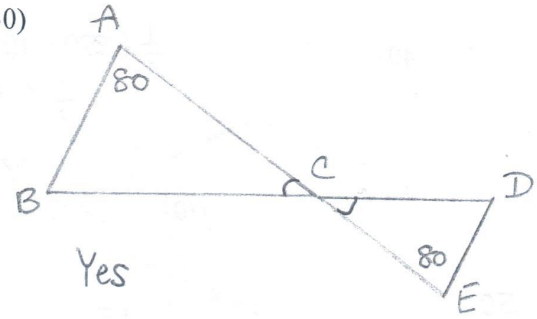
$4y = 30 \rightarrow y = 7.5$

$4:6 = 2:3$

scale factor

30-31) Determine if each pair of triangles are similar by AA. If yes, write a statement of similarity.

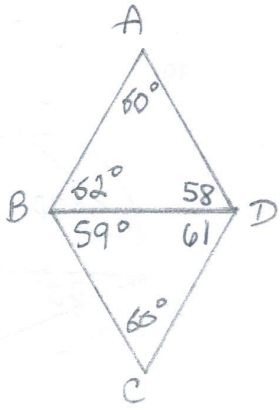
30)



Yes

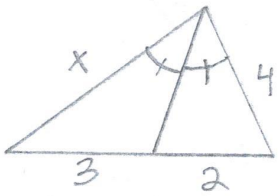
$\triangle ABC \sim \triangle EDC$

31)



Not similar

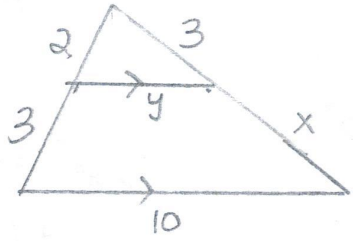
32) Solve for x



$\frac{x}{3} = \frac{4}{2}$

$2x = 12 \rightarrow x = 6$

33) Solve for x and y



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

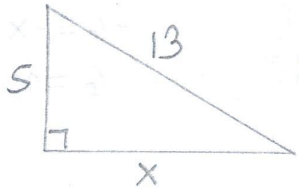
$2x = 9 \rightarrow x = 4.5$

$\frac{2}{y} = \frac{5}{10}$

$20 = 5y \rightarrow y = 4$

34-35) Find the missing side

34)

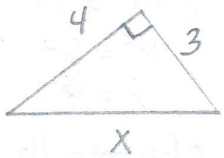


$x^2 + 5^2 = 13^2$

$x^2 = 144$

$x = 12$

35)



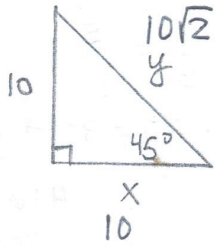
$3^2 + 4^2 = x^2$

$25 = x^2$

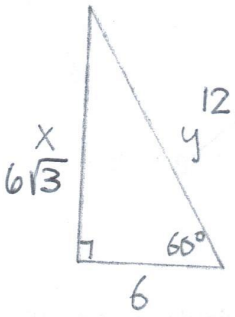
$5 = x$

36-38) Find the missing sides

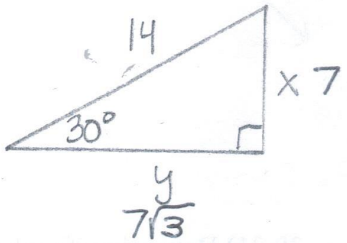
36)



37)

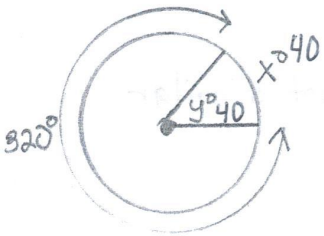


38)

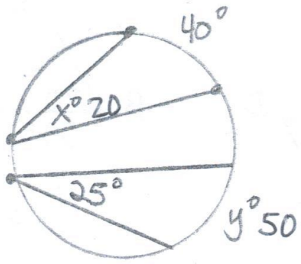


38-43 Solve for x and y

38)



39)

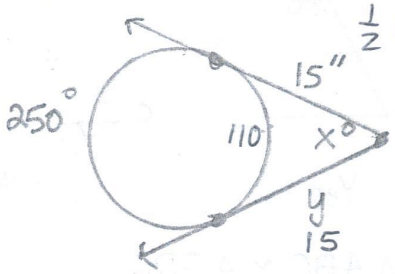


40)

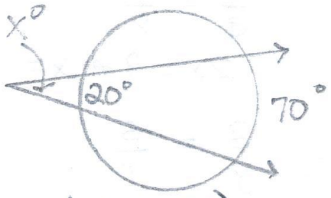
$\frac{1}{2}(250-110) =$

$\frac{1}{2}(140) =$

70



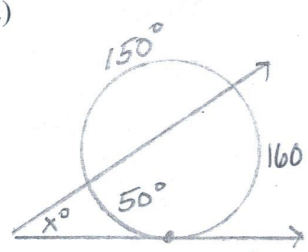
41)



$\frac{1}{2}(70-20) =$

$\frac{1}{2}(50) = 25$

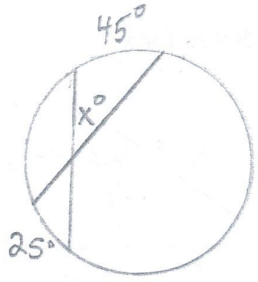
42)



$\frac{1}{2}(160-50) =$

$\frac{1}{2}(110) = 55$

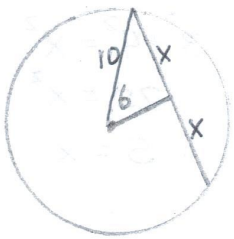
43)



$\frac{1}{2}(45+25) =$

$\frac{1}{2}(70) = 35$

44) The distance from the center to a chord is 6 cm. The radius is 10 cm. What is the length of the chord?



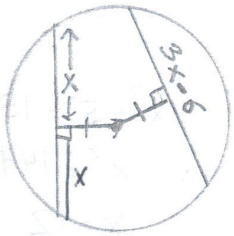
$6^2+x^2 = 10^2$

$x^2 = 64$

$x = 8$

chord = 16

45) Solve for x



$3x-6 = 2x$

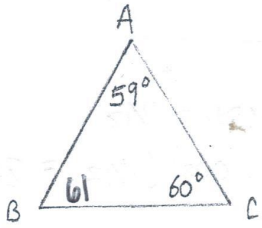
$-6 = -x$

$6 = x$

SM2

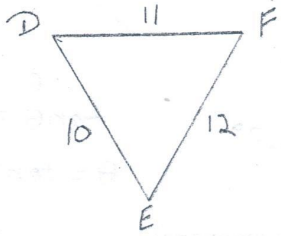
END OF YEAR REVIEW
PART 3

1) List the sides in the triangle below in order from smallest to largest



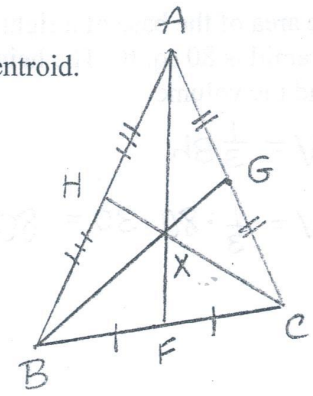
$\overline{BC}, \overline{BA}, \overline{AC}$

2) List the angles in the triangle below in order from smallest to largest



$\angle F, \angle E, \angle D$

3-5) In $\triangle ABC$ $\overline{AF}$, $\overline{BG}$, and $\overline{CH}$ are medians. Accordingly, point X is the centroid.



3) If FX = 1.5, find AX

3

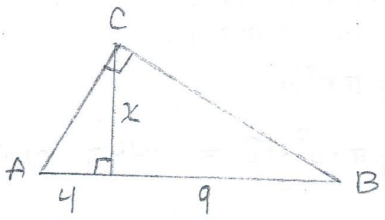
4) If BX = 5, find XG

2.5

5) If CH = 6, find CX and XH

4 2

6) ABC is a right triangle, with the right angle at C
The altitude to the hypotenuse splits the hypotenuse into segments of 4cm and 9cm. Find the length of the altitude to the hypotenuse (find x)

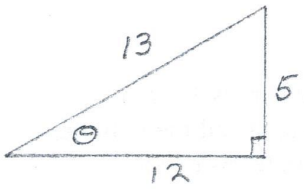


$\frac{4}{x} = \frac{x}{9}$

$x^2 = 36$

$x = 6$

7-9) Given the right triangle to the right, find



7) $\sin\theta$

$\frac{O}{H} = \frac{5}{13}$

8) $\cos\theta$

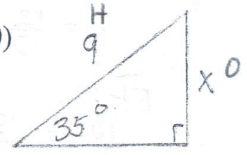
$\frac{A}{H} = \frac{12}{13}$

9) $\tan\theta$

$\frac{O}{A} = \frac{5}{12}$

10-12) Use trig to solve for x (ROUND TO THE NEAREST TENTH)

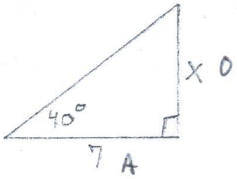
10)



$\sin 35 = \frac{x}{9}$

$x = 9\sin 35 = 5.2$

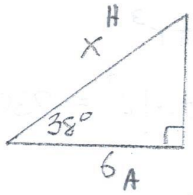
11)



$\tan 40 = \frac{x}{7}$

$x = 7\tan 40 = 5.9$

12)

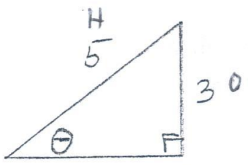


$\cos 38 = \frac{6}{x}$

$x = \frac{6}{\cos 38} = 7.6$

13-15) Use trig to solve for θ (ROUND TO NEAREST TENTH OF A DEGREE)

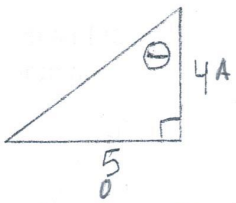
13)



$\sin\theta = 3/5$

$\theta = \sin^{-1}(3/5) = 36.9°$

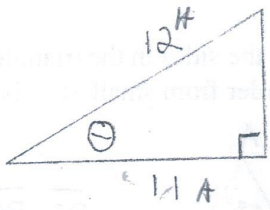
14)



$\tan\theta = 5/4$

$\theta = \tan^{-1}(5/4) = 51.3°$

15)



$\cos\theta = 11/12$

$\theta = \cos^{-1}(11/12) = 23.6°$

16) The area of the base of a right pentagonal pyramid is 80 sq. ft. The height is 30 ft. Find the volume

$V = \frac{1}{3}Bh$

$V = \frac{1}{3} \cdot 80 \cdot 30 = 800\ ft^3$

17) The radius of a cylinder is 6 in. The height is 20 in. Find the volume. (Leave your answer in terms of π)

$V = \pi r^2 h$

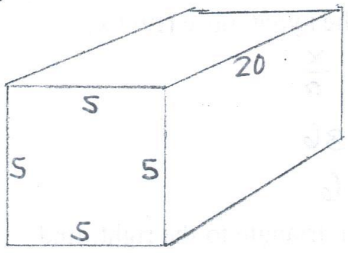
$V = \pi \cdot 6^2 \cdot 20 = 720\pi\ in^3$

18) The radius of a cone is 6 cm. The height is 12 cm. Find the volume (Leave answer in terms of π)

$V = \frac{1}{3}\pi r^2 h$

$V = \frac{1}{3}\pi \cdot 6^2 \cdot 12 = 144\pi\ cm^3$

19) The base of a right prism is a square with a perimeter of 20 in. The height of the prism is also 20 in. Find the volume.



$V = Bh$

$V = 5^2 \cdot 20 =$

$500\ in^3$

20) The radius of a sphere is 12 mm. Find the surface area and the volume. (Leave answers in terms of π)

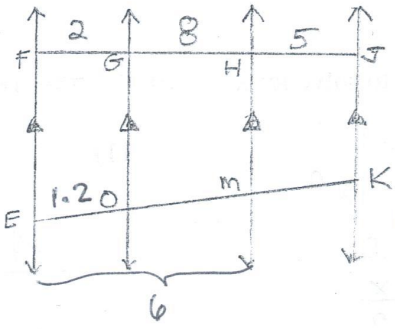
$S = 4\pi r^2$

$S = 4\pi \cdot 12^2 = 576\pi\ mm^2$

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi \cdot 12^3 = 2304\pi\ mm^3$

21) If EM = 6, find EO and EK



$\overline{EO}$:

$\frac{2}{x} = \frac{10}{6}$

$12 = 10x$

$x = \frac{12}{10} = 1.2$

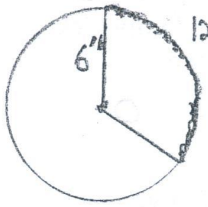
$\overline{EK}$:

$\frac{10}{6} = \frac{15}{x}$

$10x = 90$

$x = 9$

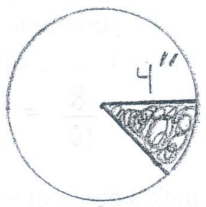
22) Find the length of the darkened arc
(Leave answer in terms of π)



$2 \cdot \pi \cdot 6 \cdot \frac{120}{360}$

4π in

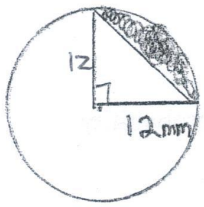
23) Find the area of the shaded region
(Leave answer in terms of π)



$\pi \cdot 4^2 \cdot \frac{45}{360}$

2π in^2

24) Find the area of the shaded region
(Round too the nearest hundredth)



Sector:
$\pi \cdot 12^2 \cdot \frac{1}{4} = 113.1$

Triangle:
$\frac{1}{2} \cdot 12 \cdot 12 = 72$

Shaded:
$113.1 - 72 = 41.1$ mm^2

25-27) Use your calculator to find

25) 7! 5,040

26) 10 P 2 90

27) 14 C 3 364

28) How many different outfits can be made from 4 shirts, 2 pairs of pants, and 3 caps?

$4 \cdot 2 \cdot 3 = 24$

29) How many ways can 6 books be arranged on a desk?

$6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 6! = 720$

30) How many ways can 4 of 6 books be arranged on a desk?

$6 \cdot 5 \cdot 4 \cdot 3 = 6\,P\,4 = 360$

31-32) A class consists of 14 boys and 15 girls.

31) How many different committees of 4 students can be selected?

$29\,C\,4 = 23{,}751$

32) How many different committees of 2 boys and 2 girls can be selected?

$14\,C\,2 = 91$

$15\,C\,2 = 105$

$91 \cdot 105 = 9{,}555$

33) What is the probability that a randomly selected committee of 4 will have 2 girls and 2 boys?

$\frac{9555}{23{,}751} = 40.2\%$

34-38) A basket contains the following jellybeans: 5 green, 3 pink, and 2 yellow 10 total

34) What is the probability that you randomly pick a pink one?

$\frac{3}{10}$

35) What is the probability that you randomly pick one that is not yellow?

$\frac{8}{10} = \frac{4}{5}$

36) What is the probability that you randomly pick a purple one?

$\frac{0}{10} = 0$

37) What is the probability that you pick a green one, put it back (what willpower) and then pick a green one again?

$\frac{5}{10} \cdot \frac{5}{10} = \frac{25}{100} = \frac{1}{4}$

38) What is the probability that you pick a green one, eat it (mmmmm) and pick another green one?

$\frac{5}{10} \cdot \frac{4}{9} = \frac{20}{90} = \frac{2}{9}$

39) You flip a thumbtack 20 times. 13 times, it lands point up. What is the experimental probability it will land point down? $\frac{7}{20}$

40) A and B are independent events. Find P(A and B) if P(A) = 0.5 and the P(B) = 0.6

$0.5 \times 0.6 = 0.3$

41) J and K are overlapping and independent events. Find the P(J or K) if the P(J) = 0.6 and P(K) = 0.7

$P(J \text{ and } k) = 0.6 \times 0.7 = 0.42$

$P(J \text{ or } k) = 0.6 + 0.7 - 0.42 = 0.88$

42-47) The table shows the distribution of the SkyHigh Orchestra

	Strings	Woodwind	Brass	Percussion	Total
seniors	20	13	10	6	49
juniors	14	9	9	4	36
sophomores	8	4	1	2	15
total	42	26	20	12	100

Find the probability of randomly picking

42) P(a senior)

$\frac{49}{100}$

43) P(one who is in the string section)

$\frac{42}{100} = \frac{21}{50}$

44) P(junior and brass)

$\frac{9}{100}$

45) P(percussion | senior)

$\frac{6}{49}$

46) P(junior | brass)

$\frac{9}{20}$

47) P(junior strings or senior brass)

$14 + 10 = 24$

$\frac{24}{100} = \frac{6}{25}$