

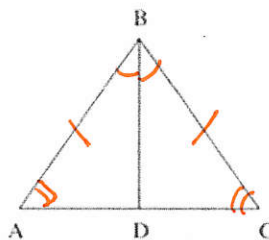
Math 2B Properties and Proofs Review

Free Response - Proof Practice

Complete the following Proofs, by filling in the blanks or by matching, if given options/choices.

1.

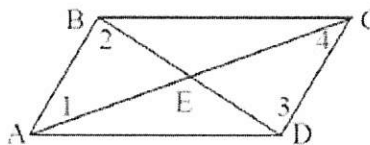
Given: $\triangle ABC$ is isosceles
 \overline{BD} bisects $\angle ABC$
 Prove: $\triangle ABD \cong \triangle CBD$



Statement	Reason
1. $\triangle ABC$ is isosceles	1. Given
2. $\overline{AB} \cong \overline{CB}$	2. Definition of an Isosceles \triangle
3. $\angle A \cong \angle C$	3. Isos. \triangle Theorem
4. \overline{BD} bisects $\angle ABC$	4. Given
5. $\angle ABD \cong \angle CBD$	5. Definition of Angles Bisector
6. $\triangle ABD \cong \triangle CBD$	6. ASA

2.

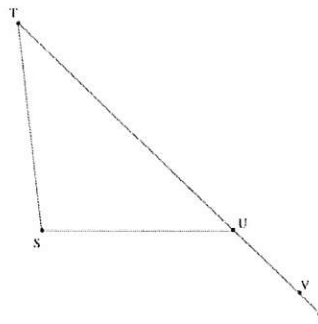
Given: $ABCD$ is a parallelogram
 Proof: \overline{AC} and \overline{BD} bisect each other at E



Statements	Reasons
1. $ABCD$ is a parallelogram	2. Given
3. $\overline{AB} \parallel \overline{DC}$	4. In \square , opposite sides are \parallel (Def of \square)
5. $\angle 1 \cong \angle 4$; $\angle 2 \cong \angle 3$	6. Alternate Interior \angle s are \cong
7. $\overline{AB} \cong \overline{DC}$	8. Opposite sides of a parallelogram are congruent
9. $\triangle ABE \cong \triangle CDE$	10. ASA
11. $\overline{AE} \cong \overline{CE}$; $\overline{BE} \cong \overline{DE}$	12. CPCTC
13. \overline{AC} & \overline{BD} bisect at E	14. Def of a bisector

✶

3. Given: $m\angle T = 40^\circ$
 $m\angle SUV = 145^\circ$
 Prove: $m\angle S = 105^\circ$



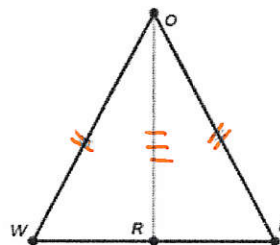
Statements	Reasons
1. $m\angle T = 40$	Given
$m\angle SUV = 145^\circ$	2. Given
3. $\angle SUV = \angle T + \angle S$	Exterior Angles Theorem
4. $145 = 40 + \angle S$	Substitution Property of Equality
5. $m\angle S = 105^\circ$	5. Subtraction Symmetric

b. $105 = m\angle S$
 $m\angle S = 105$

Possible Choices to fill in the above Proof

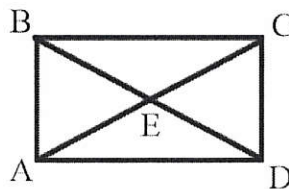
Statements	Reasons
A. $m\angle SUV = 145^\circ$	A. Subtraction Property of Equality
B. $m\angle SUT + m\angle UTS = 180^\circ$	B. Given
C. $145^\circ = m\angle S + 40^\circ$	C. Definition of Linear Pairs
D. $m\angle SUV = m\angle S + m\angle T$	D. Vertical Angles are Congruent
E. $m\angle T = 40^\circ$	E. Substitution Property of Equality

4. Given: $\triangle WOK$ is isosceles
 R is the midpoint of \overline{WK}
 Prove: $\angle OWR \cong \angle OKR$



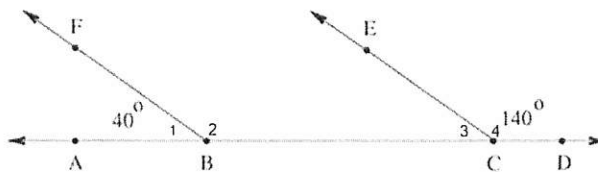
Statement	Reason
1. $\triangle WOK$ is isosceles	1. Given
2. $\overline{WO} \cong \overline{KO}$	2. Definition of an isosceles Triangle
3. R is the midpoint of \overline{WK}	3. Given
4. $\overline{WR} \cong \overline{KR}$	4. Def. of midpt
5. $\overline{RO} \cong \overline{RO}$	5. Reflexive Property of Congruence
6. $\triangle WRO \cong \triangle KRO$	6. SSS
7. $\angle OWR \cong \angle OKR$	7. CPCTC

5. Given: $ABCD$ is a rectangle
 $AC = 6x - 15$
 $BD = x + 25$
 Prove: $x = 8$



Statement	Reason
1. $ABCD$ is a rectangle	1. Given
2. $BD \cong AC$	2. The diagonals of a rectangle are congruent
3. $AC = BD$	3. \cong segments have = length
4. $AC = 6x - 15, BD = x + 25$	4. Given
5. $6x - 15 = x + 25$	5. Substitution
6. $5x - 15 = 25$	6. Subtraction
7. $5x = 40$	7. Addition
8. $x = 8$	8. Division

6. Given: Line $ABCD$
 $\angle 1$ and $\angle 4$ are supplementary
 Prove: $\overline{BF} \parallel \overline{CE}$



Statement	Reason
1. Line $ABCD$	Given
$\angle 1$ and $\angle 4$ are supplementary	2. Given
3. $\angle 1 + \angle 4 = 180$	Definition of Supplementary \angle 's
$\angle 1$ and $\angle FBC$ are supplementary	4. Definition of Linear Pair
5. $\angle 1 + \angle FBC = 180^\circ$	Definition of Supplementary \angle 's
$m\angle 4 + m\angle 1 = m\angle 1 + m\angle FBC$	6. Substitution
$m\angle 4 = m\angle FBC$	7. Subtraction
8. $\angle 4 \cong \angle FBC$	Definition of \cong
$\overline{BF} \parallel \overline{CE}$	9. Converse of corresponding

Possible Choices to fill in the above Proof

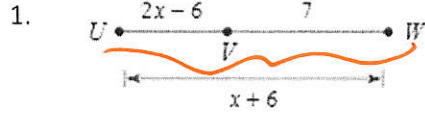
Statements	Reasons
A. $m\angle FBC = 140^\circ$	A. if corresponding \angle 's \cong , then lines \parallel
B. $m\angle 1 + m\angle FBC = 180^\circ$	B. Given
C. $\angle 4 \cong \angle FBC$	C. Definition of Linear Pairs
D. $m\angle DCB = m\angle 1 + m\angle FBC$	D. Vertical Angles are Congruent
E. $m\angle 4 + m\angle 1 = 180^\circ$	E. Substitution Property of Equality
F. $m\angle 1 = m\angle 4$	F. if same side interior \angle 's are supplementary, then lines \parallel
G. \overline{AD}	G. Subtraction Property of Equality

Math 2B Properties and Proofs Review

Name: Key

Multiple Choice Practice

Find the value of x , by setting up the correct equation form the given diagram or information.



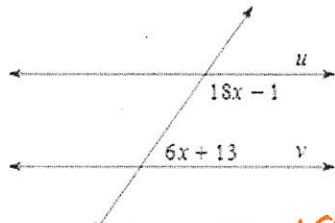
$$2x - 6 + 7 = x + 6$$

$$2x + 1 = x + 6$$

$$\begin{array}{r} -x & -1 & -x & -1 \\ \hline x & = & 5 \end{array}$$

A) -5
 B) 5
 C) 6
 D) 10

3. to make $u \parallel v$



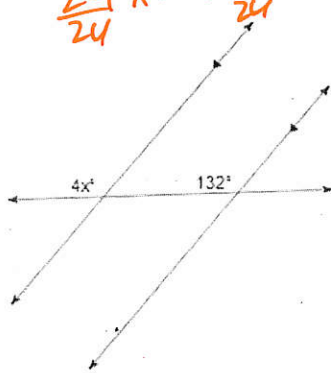
$$18x - 1 + 6x + 13 = 180$$

$$24x + 12 = 180$$

$$\frac{24x}{24} = \frac{168}{24} \quad x = 7$$

A) -7
 B) 5
 C) 7
 D) 9

5.

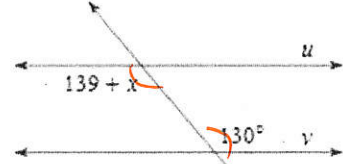


$$\frac{4x}{4} = \frac{132}{4}$$

$$x = 33$$

A) 32
 B) 33
 C) 35
 D) 36

2. to make $u \parallel v$

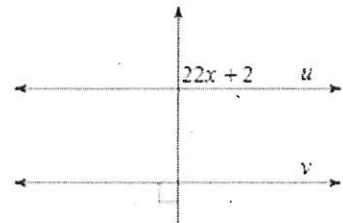


$$139 + x = 130$$

$$\begin{array}{r} -139 \\ \hline x = -9 \end{array}$$

A) -11
 B) -10
 C) -9
 D) 9

4. to make $u \parallel v$

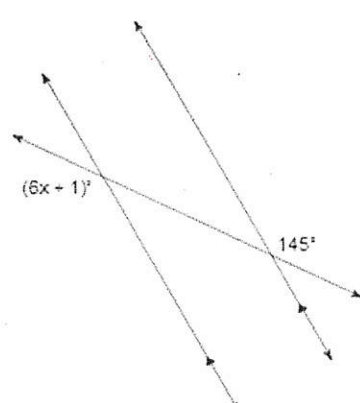


$$22x + 2 = 90$$

$$\begin{array}{r} -2 \\ \hline 22x = 88 \\ x = 4 \end{array}$$

A) -7
 B) -5
 C) 4
 D) 11

6.



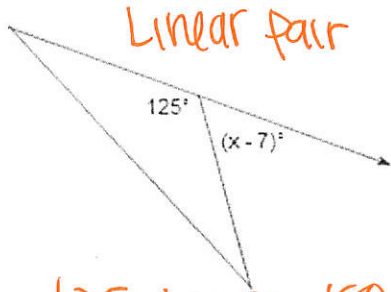
$$6x + 1 = 145$$

$$6x = 144$$

$$x = 24$$

A) 23
 B) 24
 C) 26
 D) 27

7.



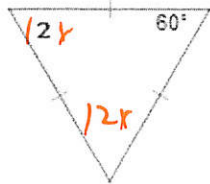
- A) 58
- B) 61
- C) 62
- D) 63

$$125 + x - 7 = 180$$

$$-118 + x = 180$$

$$x = 198$$

9. $m\angle 2 = 12x$



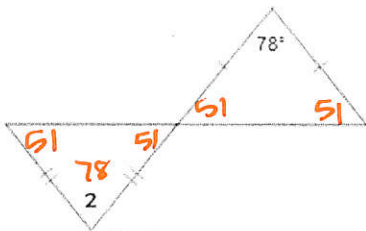
- A) -7
- B) -5
- C) -4
- D) 5

$$24x + 60 = 180$$

$$24x = 120$$

$$x = 5$$

11. $m\angle 2 = 15x + 3$



- A) -8
- B) -7
- C) 5
- D) 7

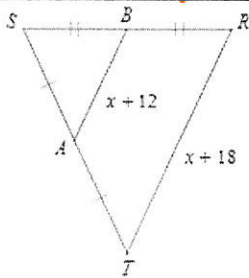
$$78 = 15x + 3$$

$$-3 \quad -3$$

$$75 = 15x$$

$$\frac{75}{15} = \frac{15x}{15} \quad x = 5$$

13.



- A) -9
- B) -6
- C) 8
- D) 12

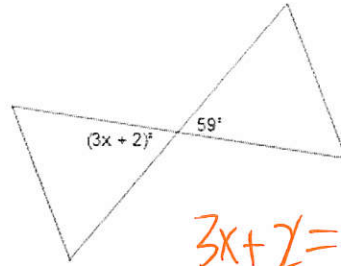
$$2(x+12) = x+18$$

$$2x+24 = x+18$$

$$-x-24 \quad -x-24$$

$$x = -6$$

8.



- A) 18
- B) 19
- C) 20
- D) 21

$$3x + 2 = 59$$

$$-2 \quad -2$$

$$3x = 57$$

$$\frac{3x}{3} = \frac{57}{3} \quad x = 19$$

10. $m\angle 2 = 6x - 2$



- A) -8
- B) -6
- C) 5
- D) 8

$$46 = 6x - 2$$

$$48 = 6x$$

$$x = 8$$

12.



- A) -11
- B) -6
- C) 8
- D) 12

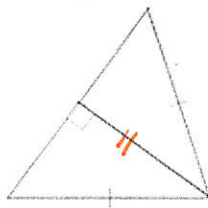
$$2x - 18 = 6$$

$$2x = 24$$

$$x = 12$$

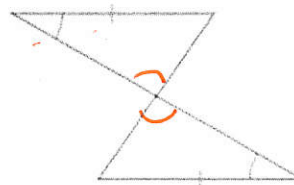
State if the two triangles can be proven congruent. If so, state how you know.

14.



- A) ASA
- B) SSS
- C) HL**
- D) not congruent

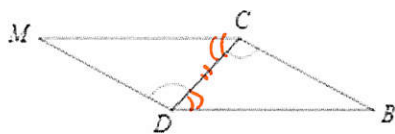
15.



- A) LA
- B) SAS
- C) ASA
- D) AAS**

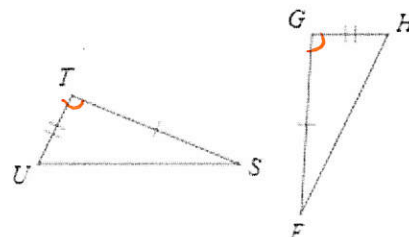
What additional information is needed to show the triangles are congruent for the given postulate or theorem.

16. ASA



- A) $\angle BDC \cong \angle MCD$**
- B) $\overline{BD} \cong \overline{MC}$
- C) $\overline{DC} \cong \overline{CD}$ or $\overline{CB} \cong \overline{DM}$
- D) $\angle DCB \cong \angle CDM$

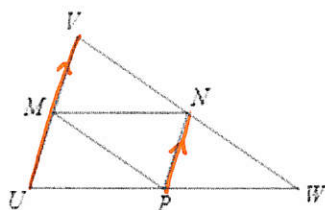
17. SAS



- A) $\overline{TU} \cong \overline{GH}$
- B) $\angle S \cong \angle F$ or $\angle T \cong \angle G$
- C) $\angle T \cong \angle G$**
- D) $\overline{ST} \cong \overline{FG}$ or $\overline{US} \cong \overline{HF}$

In the triangle, M , N , and P are the midpoints of the sides. Name a segment parallel to the one given.

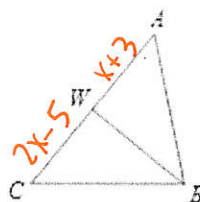
18. $\overline{NP} \parallel$ ___



- A) \overline{MP}
- B) \overline{UV}**
- C) \overline{VW}
- D) \overline{UW}

Each figure shows a triangle with one or more of its medians. Find the value of x from the given information

19.



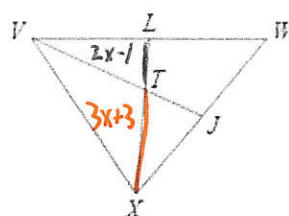
$WC = 2x - 5$ and $WA = x + 3$

- A) 1
- B) 3
- C) 8**
- D) 9

$$2x - 5 = x + 3$$

$$x = 8$$

20.



$XT = 3x + 3$ and $TL = 2x - 1$

- A) 10
- B) 9
- C) 5**
- D) 3

$$XL = 5x + 2$$

$$3x + 3 = \frac{2}{3}(5x + 2)$$

or

$$2(2x - 1) = 3x + 3$$

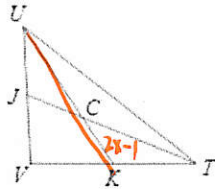
$$4x - 2 = 3x + 3$$

$$-3x + 2 = -3x + 3$$

$$x = 5$$

Each figure shows a triangle with one or more of its medians. Find the value of x from the given information

21. $UK = 3x$ and $CK = 2x - 1$

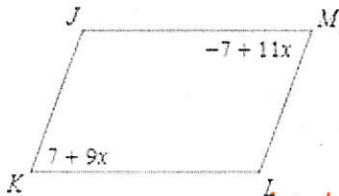


- A) 1
- B) 5
- C) 6
- D) 9

$$2x - 1 = \frac{1}{3}(3x) \quad \left| \begin{array}{l} 3(2x-1) = 3x \\ 6x - 3 = 3x \\ -6x \quad -6x \\ -3 = -3x \\ -3 = -3x \\ -1 = -x \\ -1 = -x \\ x = 1 \end{array} \right.$$

Each figure is a parallelogram. Find the value of x .

22.



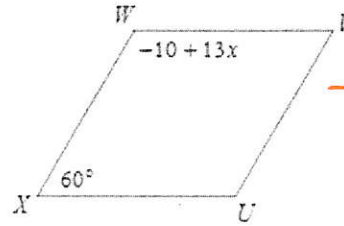
- A) 2
- B) 5
- C) 6
- D) 7

$$7 + 9x = -7 + 11x$$

$$+7 \quad -9x \quad +7 \quad -9x$$

$$\frac{14}{2} = \frac{2x}{2} \quad x = 7$$

23.



- A) 12
- B) 10
- C) 5
- D) 2

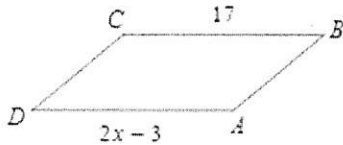
$$-10 + 13x + 60 = 180$$

$$13x + 50 = 180$$

$$13x = 130$$

$$x = 10$$

24.



- A) 2
- B) 4
- C) 9
- D) 10

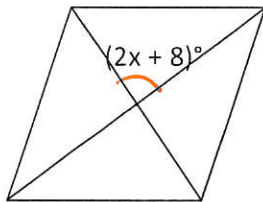
$$2x - 3 = 17$$

$$2x = 20$$

$$x = 10$$

The figure below is a rhombus. Find the value of x .

25.



- A) 31
- B) 41
- C) 58
- D) 60

$$2x + 8 = 90$$

$$2x = 82$$

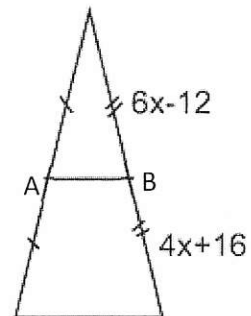
$$x = 41$$

26. Which of these statements are true for all parallelograms?

- A) Diagonals bisect each other.
- B) Diagonals are congruent.
- C) Consecutive angles are congruent.
- D) All sides are congruent.

27. Find the value of x that proves AB is a midsegment.

- A) 2
- B) 2.8
- C) 5
- D) 14



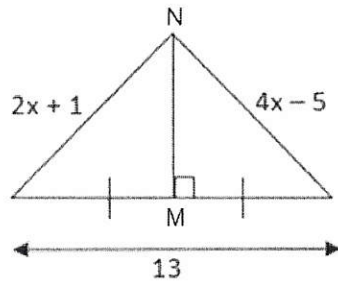
$$6x - 12 = 4x + 16$$

$$2x = 28$$

$$x = 14$$

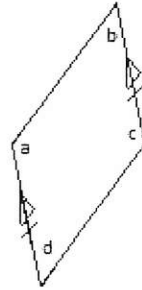
28. Given MN is a perpendicular bisector, find the value of x .

- A) -2
- b) 1
- C) 3**
- D) 6



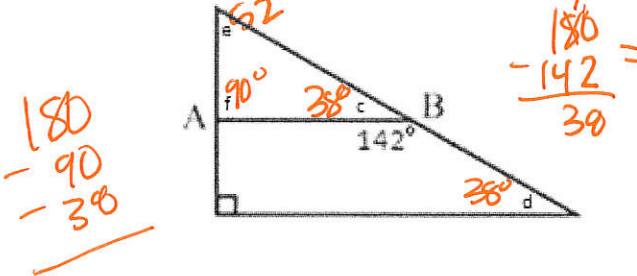
29. What is the relationship between $\angle a$ and $\angle b$.

- A) Complimentary
- B) Congruent
- C) Supplementary**
- D) Cannot be determined



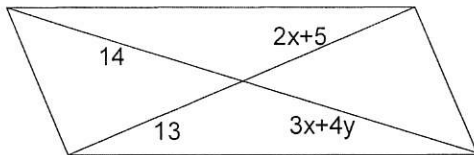
$$\begin{aligned} 2x+1 &= 4x-5 \\ -2x+1 & \quad -2x+5 \\ \hline 6 &= 2x \quad x=3 \end{aligned}$$

30. Given midsegment AB of the triangle below, find the values of $\angle c, \angle d, \angle e$ and $\angle f$.



- A) $c = 28^\circ, d = 142^\circ, e = 62^\circ, f = 90^\circ$
- B) $c = 38^\circ, d = 38^\circ, e = 62^\circ, f = 90^\circ$
- C) $c = 38^\circ, d = 38^\circ, e = 52^\circ, f = 90^\circ$**
- D) $c = 142^\circ, d = 38^\circ, e = 38^\circ, f = 142^\circ$

31. In the following parallelogram, find the value of Y .



- A) $\frac{1}{2}$**
- B) $\frac{1}{3}$
- ~~C) $\frac{1}{4}$~~
- D) 4

$$\begin{aligned} 2x+5 &= 13 \\ -5 & \quad -5 \\ \hline 2x &= 8 \\ x &= 4 \end{aligned}$$

$$\begin{aligned} 14 &= 3x+4y \\ 14 &= 3(4)+4y \\ 14 &= 12+4y \\ 2 &= 4y \\ \frac{2}{4} &= \frac{4y}{4} \quad y = \frac{2}{4} = \frac{1}{2} \end{aligned}$$

Name the property:

32) If $a = b$ and $b = c$ then $a = c$

Transitive

33) $A = A$

Reflexive

34) If $a = b$, then $a + c = b + c$

Addition P.O.E.

35) If $a = b$, then $b = a$

Symmetric

36) If two sides of a triangle are congruent, then the angles opposite those sides are congruent

Isosceles Δ Theorem

37) The larger segment is congruent to the sum of the segments that comprise it

Segment Addition Postulate

38) Two angles that are adjacent and supplementary are called a

Linear Pair

39) If alternate interior angles are congruent, then the lines are parallel

Converse of Alt. Int. Angles Thm

40) The exterior angle = the sum of the two remote interior angles

Exterior Angle Theorem

41) A segment connecting the midpoints of two sides of a triangle is called a

Midsegment

42) The centroid is $\frac{2}{3}$ the distance from the vertex of a triangle to the midpoint of the opposite side