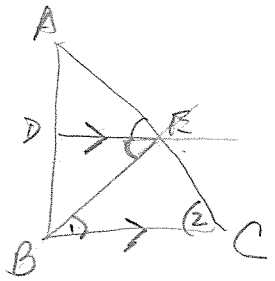
3.1 – 3.3 ANSWER KEY

Determine whether the following statements are sometimes, always or never true. Be prepared to justify your answer.

1. Three lines intersecting at one point are coplanar. sometimes
2. Two lines that are not coplanar intersect. never
3. Two lines parallel to a third line are parallel to each other. always
4. Two planes parallel to the same line are parallel to each other. sometimes
5. Two planes parallel to the same plane are parallel to each other. always
6. If a plane is parallel to one of two skew lines, then it intersects the other skew line. sometimes
7. Two lines that do not intersect are parallel. sometimes
8. Two lines that are perpendicular to the same line are parallel. sometimes
9. Two lines that are parallel to the same plane are parallel to each other. sometimes
10. Lines in two parallel planes are parallel to each other. sometimes
11. If $\angle 1$ and $\angle 2$ are alternate interior angles, then the vertical angles relative to them are alternate exterior angles. always
12. If $\angle 3$ and $\angle 4$ are same-side interior angles, then their supplements are also same-side interior angles. sometimes
13. If a line and a plane do not intersect, then they are parallel. always

① 

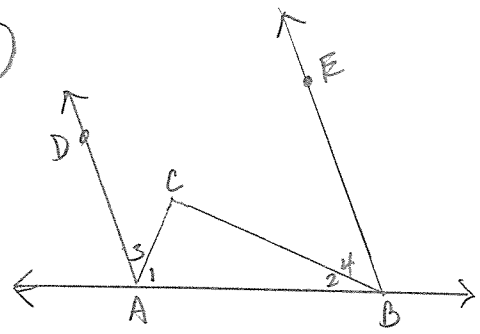
① $\overline{DE} \parallel \overline{BC}$ → ② $\angle 1 \cong \angle BED$ alt. int. $\angle$s
③ $\angle 1 \cong \angle 2$
→ ④ $\angle 2 \cong \angle BED$
⑤ $\angle 2 \cong \angle AED$ corresp. $\angle$s $\cong$
→ ⑥ $\angle BED \cong \angle AED$
→ ⑦ $\overline{ED}$ bisects $\angle AEB$

① Given
② 2 ∥ lines & trans. → alt. int. ∠s ≅
③ Given
④ Transitive Prop
⑤ 2 ∥ lines & trans. → corresp. ∠s ≅
⑥ Transitive Prop
⑦ ∠ bisector ÷ ∠ into 2 ≅ parts

② ① $\angle B$ supp $\angle D$ → ② $m\angle B + m\angle D = 180$
③ $\angle BCD \cong \angle CDE$ → ④ $m\angle BCD = m\angle CDE$
→ ⑤ $m\angle B + m\angle BCD = 180$
→ ⑥ $\angle B$ supp $\angle BCD$ → ⑦ $\overline{AB} \parallel \overline{DC}$

① Given
② Supplem. ∠s total 180
③ Given
④ ≅ ∠s have = measures
⑤ Substitution Property
⑥ Supplement. ∠s. total 180
⑦ 2 lines & tran & same side ∠s are supplemat → 2 ∥ lines.

③



① $\overline{AD} \parallel \overline{BE}$ → ② $\angle DAB$ supp $\angle EBA$ → ③ $m\angle DAB + m\angle EBA = 180$

④ $m\angle DAB = m\angle 1 + m\angle 3$

⑤ $m\angle 1 + m\angle 3 + m\angle EBA = 180$

⑥ $m\angle EBA = m\angle 2 + m\angle 4$

→ ⑦ $m\angle 1 + m\angle 3 + m\angle 2 + m\angle 4 = 180$

⑧ $\angle 1$ complements $\angle 2$ → ⑨ $m\angle 1 + m\angle 2 = 90$

⑩ $m\angle 3 + m\angle 4 = 90$

⑪ $\overline{CA}$ bisects $\angle DAB$ → ⑫ $\angle 1 \cong \angle 3$ → ⑬ $m\angle 1 = m\angle 3$

→ ⑭ $m\angle 1 + m\angle 4 = 90$

⑮ $\angle 1$ comp $\angle 4$

⑯ $\angle 1$ comp $\angle 2$

→ ⑰ $\angle 2 \cong \angle 4$ → ⑱ $\overline{BC}$ bisects $\angle ABE$

① Given
② 2 ∥ lines & trans → same side $\angle$s supp
③ Def supp $\angle$s
④ Angle Addition Post
⑤ Substitution
⑥ Angle Add. Post
⑦ Substitution
⑧ Given
⑨ Def complement $\angle$s
⑩ Subtraction Property
⑪ Given
⑫ Def $\angle$ bisector
⑬ Def $\cong$ angles
⑭ Substitution
⑮ Def complementary $\angle$s
⑯ Given
⑰ Congruent Complements Thm
⑱ Def of angle bisector

WRITTEN EXERCISES KEY

① $\overline{AB} \parallel \overline{FC}$ ② $\overline{AE} \parallel \overline{BD}$ or $\overline{FE} \parallel \overline{CD}$

③ $\overline{AB} \parallel \overline{FC}$ ④ $\overline{FB} \parallel \overline{EC}$ ⑤ NONE

⑥ $\overline{AE} \parallel \overline{BD}$ ⑦ NONE ⑧ NONE

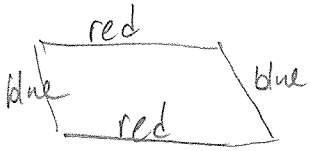
⑨ $\overline{AE} \parallel \overline{BD}$ ⑩ $\overline{AE} \parallel \overline{BD}$ ⑪ $\overline{AE} \parallel \overline{BD}$

⑫ $\overline{FB} \parallel \overline{EC}$ ⑬ $\overline{AB} \parallel \overline{BD}$ ⑭ NONE

⑮ $\overline{FB} \parallel \overline{EC}$ and $\overline{AE} \parallel \overline{BD}$

⑯ $\overline{AB} \parallel \overline{FC}$ and $\overline{AE} \parallel \overline{BD}$

⑱



$x-40+y=180$
$x-40+x+40=180$

$x=90$
$y=130$

⑲

$3x=105 \rightarrow x=35$
$35+105+2y=180 \rightarrow y=20$

㉔ ① $\overline{BE}$ bisects $\angle DBA \rightarrow$ ② $\angle 2 \cong \angle 3$ ③ $\angle 3 \cong \angle 1$ $\rightarrow$ ④ $\angle 2 \cong \angle 1 \rightarrow$ ⑤ $\overline{CD} \parallel \overline{BE}$

① Given
② $\angle$ bisector divides $\angle$ into 2 $\cong$ parts
③ Given
④ Transitive Prop.
⑤ 2 lines & transversal & $\cong$ alt. int. $\angle$s $\rightarrow$ 2 $\parallel$ lines

㉕ ① $\overline{BE} \perp \overline{DA}$, $\overline{CD} \perp \overline{DA}$ $\rightarrow$ ② $\overline{BE} \parallel \overline{CD} \rightarrow$ ③ $\angle 1 \cong \angle 2$

① Given
② Two lines $\perp$ to same line are parallel
③ 2 $\parallel$ lines cut by transv. $\rightarrow$ alt. int. $\angle$s $\cong$.

(26)

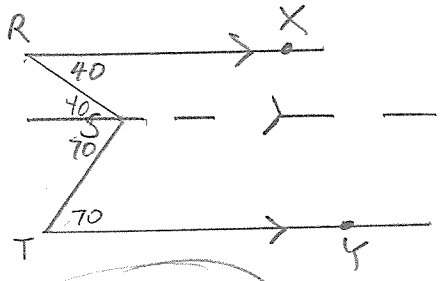
(1) $\overline{BE} \perp \overline{DA}$ → (2) $\angle BEA$ is right $\angle$ → (3) $m\angle BEA = 90$

(4) $\angle C \cong \angle 3$ → (5) $\overline{CD} \parallel \overline{BE}$ → (6) $\angle CDE \cong \angle BEA$ → (7) $m\angle CDE = m\angle BEA$

(8) $m\angle CDE = 90$ → (9) $\angle CDE$ is right → (10) $\overline{CD} \perp \overline{DA}$

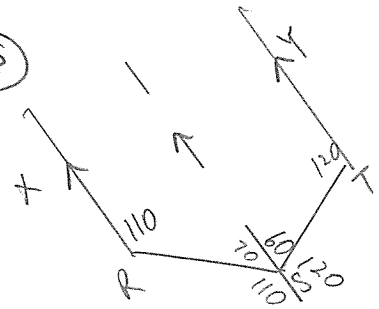
(1) Given
(2) Def of $\perp$ lines
(3) Def of right $\angle$
(4) Given
(5) 2 lines & trans & $\cong$ corresp. $\angle$s → 2 $\parallel$ lines
(6) 2 $\parallel$ lines & trans → alt. int. $\angle$s $\cong$
(7) Def. of $\cong$ $\angle$s.
(8) Substitution
(9) Def. of right $\angle$
(10) If 2 lines form rt. $\angle$, then they are $\perp$ lines.

(27)



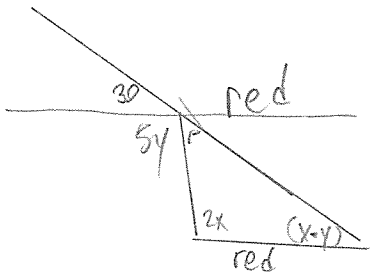
$m\angle RST = 110$

(28)



$m\angle RST = 130$

(29)



$x - y = 30$
$5y = 2x$

$y = 20$
$x = 50$

Last page of 3 proofs:
See # 24, 25, 26 (same)