

MYSTERY PICTURE



SIMILAR TRIANGLES: CORRESPONDING ANGLES AND SIDES

Is It Always True?

25 equations, no drawings · read the letters · a picture appears

FREE

1 $\triangle ABC \sim \triangle EDF$ $m\angle B = m\angle D$	2 $\triangle JKL \sim \triangle PQR$ $\frac{JK}{PQ} = \frac{KL}{QR}$	3 $\triangle MNP \sim \triangle STU$ $MN = ST$	4 $\triangle ABC \sim \triangle FDE$ $m\angle B = m\angle E$	5 $\triangle GHJ \sim \triangle XYZ$ $\frac{GH}{XY} = \frac{YZ}{HJ}$
6 $\triangle RST \sim \triangle LKM$ $\frac{RS}{ST} = \frac{LK}{KM}$	7 $\triangle DEF \sim \triangle UVW$ $DE \cdot VW = EF \cdot UV$	8 $\triangle PQR \sim \triangle BCA$ $\frac{PQ}{BC} = \frac{QR}{AB}$	9 $\triangle KLM \sim \triangle XYZ$ $m\angle K = m\angle Z$	10 $\triangle ABC \sim \triangle DEF$ $\frac{AB}{BC} = \frac{EF}{DE}$
11 $\triangle HJK \sim \triangle NML$ $m\angle K = m\angle L$	12 $\triangle STU \sim \triangle HGJ$ $\frac{HG}{ST} = \frac{GJ}{TU}$	13 $\triangle WXY \sim \triangle CDE$ $\frac{WX}{CD} = \frac{XY}{CE}$	14 $\triangle PQR \sim \triangle UVW$ $PQ \cdot UV = QR \cdot VW$	15 $\triangle LMN \sim \triangle RST$ $LN = RT$
16 $\triangle ABC \sim \triangle JKL$ $\frac{BC}{AC} = \frac{KL}{JL}$	17 $\triangle DEF \sim \triangle QRP$ $m\angle F = m\angle P$	18 $\triangle GHK \sim \triangle STU$ $\frac{HK}{TU} = \frac{SU}{GK}$	19 $\triangle MNP \sim \triangle BCD$ $\frac{MN}{NP} = \frac{CD}{BC}$	20 $\triangle XYZ \sim \triangle FGH$ $m\angle X = m\angle G$
21 $\triangle RST \sim \triangle FDE$ $\frac{ST}{DE} = \frac{RT}{FE}$	22 $\triangle JKL \sim \triangle MNP$ $JK \cdot NP = KL \cdot MN$	23 $\triangle ABC \sim \triangle XZY$ $\frac{AC}{XY} = \frac{BC}{ZY}$	24 $\triangle UVW \sim \triangle MKL$ $m\angle W = m\angle L$	25 $\triangle PQR \sim \triangle EFG$ $\frac{EF}{PQ} = \frac{QR}{FG}$

1. **Give each student page 3** and a pencil.
2. **Say this once:** *“Each square has a similarity statement and an equation. Is the equation always true for those two triangles? If yes, fill the square with slanted lines. If no, leave it white.”*
3. **Let them work.** The picture shows when they are right. Nothing else is needed.

Student sheet	page 3, one per student. A box at the top shows how a similarity statement pairs the letters.
Answers	page 4, for you.

No square has a drawing and no square has a number. Students decide from the letters alone. If $\triangle ABC \sim \triangle DEF$, then A goes with D, B with E and C with F. Partner angles are equal. Every side of $\triangle DEF$ is the scale factor times its partner in $\triangle ABC$.

The squares test four things. Some ask about two angles. Some ask about two fractions of sides, like $AB/DE = BC/EF$, where each fraction uses one side from each triangle. Some ask about two fractions where each fraction uses two sides of the same triangle, like $AB/BC = DE/EF$. That one is true too: the two triangles have the same shape, so a ratio inside one triangle equals the matching ratio inside the other. A few squares give a proportion after cross-multiplying, like $AB \cdot EF = BC \cdot DE$.

Each white square tests a common mistake. Some students turn one fraction upside down, so one side of the equation has the big triangle on top and the other has the small one. Some match a side or an angle with the wrong partner. Some write $AB = DE$, which treats similar triangles as congruent. Twelve squares are filled.

If part of a student's picture looks wrong, the mistake is in that square. Ask: *“Write the two names one above the other. Which letter is under the letter in the equation?”* Guessing does not work. Every simple guessing rule, such as filling every square that has fractions, gets at least nine squares wrong.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.
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Mystery Picture — always true?

Similar triangles

Name _____

Period _____

Date _____

Each square has a similarity statement and an equation under it. **Is the equation always true for those two triangles? If yes, fill the square with slanted lines. If no, leave it white.** No square has a drawing. Use only the letters. When you finish, a picture appears. If part of it is missing, or one square does not fit, check that square again.

$\triangle ABC \sim \triangle DEF$. Write the two names one above the other.

$\triangle$	A	B	C
$\triangle$	D	E	F

Letters in the same column are partners. Equal angles: $\angle A = \angle D$, $\angle B = \angle E$, $\angle C = \angle F$. AB goes with DE.

Equal ratios: $\frac{DE}{AB} = \frac{EF}{BC} = \frac{FD}{CA}$. This number is the scale factor.

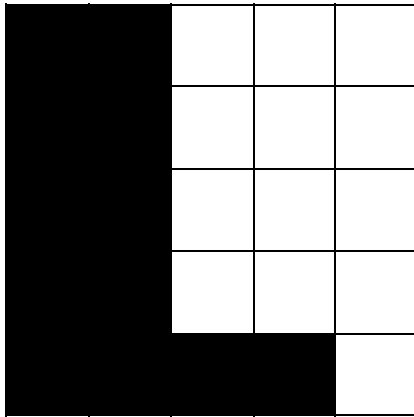
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Mystery Picture — answers

For the teacher



The finished picture is **the letter L**. Twelve squares are filled.

To find the partners, read the two names of the statement in order. The first letters go together, then the second letters, then the third letters. The table gives the reason for every square.

	Statement	Equation	Answer	Why
1	$\triangle ABC \sim \triangle EDF$	$m\angle B = m\angle D$	fill	The statement pairs B with D, so the angles are equal.
2	$\triangle JKL \sim \triangle PQR$	$JK/PQ = KL/QR$	fill	JK goes with PQ and KL with QR, and both fractions have the same triangle on top.
3	$\triangle MNP \sim \triangle STU$	$MN = ST$	white	MN and ST are partners, but the sizes can differ. $MN = ST$ only when the scale factor is 1.
4	$\triangle ABC \sim \triangle FDE$	$m\angle B = m\angle E$	white	The statement pairs B with D, not with E.
5	$\triangle GHJ \sim \triangle XYZ$	$GH/XY = YZ/HJ$	white	GH/XY has $\triangle GHJ$ on top and YZ/HJ has $\triangle XYZ$ on top: one is upside down.
6	$\triangle RST \sim \triangle LKM$	$RS/ST = LK/KM$	fill	Inside each triangle: RS goes with LK and ST with KM, in the same order.
7	$\triangle DEF \sim \triangle UVW$	$DE \cdot VW = EF \cdot UV$	fill	Dividing both sides by $EF \cdot VW$ gives $DE/EF = UV/VW$. Inside each triangle: DE goes with UV and EF with VW, in the same order.
8	$\triangle PQR \sim \triangle BCA$	$PQ/BC = QR/AB$	white	QR goes with CA, not with AB.
9	$\triangle KLM \sim \triangle XYZ$	$m\angle K = m\angle Z$	white	The statement pairs K with X, not with Z.
10	$\triangle ABC \sim \triangle DEF$	$AB/BC = EF/DE$	white	AB goes with DE and BC with EF, so EF/DE is upside down.
11	$\triangle HJK \sim \triangle NML$	$m\angle K = m\angle L$	fill	The statement pairs K with L, so the angles are equal.
12	$\triangle STU \sim \triangle HGJ$	$HG/ST = GJ/TU$	fill	HG goes with ST and GJ with TU, and both fractions have the same triangle on top.
13	$\triangle WXY \sim \triangle CDE$	$WX/CD = XY/CE$	white	XY goes with DE, not with CE.
14	$\triangle PQR \sim \triangle UVW$	$PQ \cdot UV = QR \cdot VW$	white	Dividing both sides by $QR \cdot UV$ gives $PQ/QR = VW/UV$. PQ goes with UV and QR with VW, so VW/UV is upside down.
15	$\triangle LMN \sim \triangle RST$	$LN = RT$	white	LN and RT are partners, but the sizes can differ. $LN = RT$ only when the scale factor is 1.
16	$\triangle ABC \sim \triangle JKL$	$BC/AC = KL/JL$	fill	Inside each triangle: BC goes with KL and AC with JL, in the same order.
17	$\triangle DEF \sim \triangle QRP$	$m\angle F = m\angle P$	fill	The statement pairs F with P, so the angles are equal.
18	$\triangle GHK \sim \triangle STU$	$HK/TU = SU/GK$	white	HK/TU has $\triangle GHK$ on top and SU/GK has $\triangle STU$ on top: one is upside down.
19	$\triangle MNP \sim \triangle BCD$	$MN/NP = CD/BC$	white	MN goes with BC and NP with CD, so CD/BC is upside down.
20	$\triangle XYZ \sim \triangle FGH$	$m\angle X = m\angle G$	white	The statement pairs X with F, not with G.
21	$\triangle RST \sim \triangle FDE$	$ST/DE = RT/FE$	fill	ST goes with DE and RT with FE, and both fractions have the same triangle on top.
22	$\triangle JKL \sim \triangle MNP$	$JK \cdot NP = KL \cdot MN$	fill	Dividing both sides by $KL \cdot NP$ gives $JK/KL = MN/NP$. Inside each triangle: JK goes with MN and KL with NP, in the same order.
23	$\triangle ABC \sim \triangle XZY$	$AC/XY = BC/ZY$	fill	AC goes with XY and BC with ZY, and both fractions have the same triangle on top.
24	$\triangle UVW \sim \triangle MKL$	$m\angle W = m\angle L$	fill	The statement pairs W with L, so the angles are equal.
25	$\triangle PQR \sim \triangle EFG$	$EF/PQ = QR/FG$	white	EF/PQ has $\triangle EFG$ on top and QR/FG has $\triangle PQR$ on top: one is upside down.