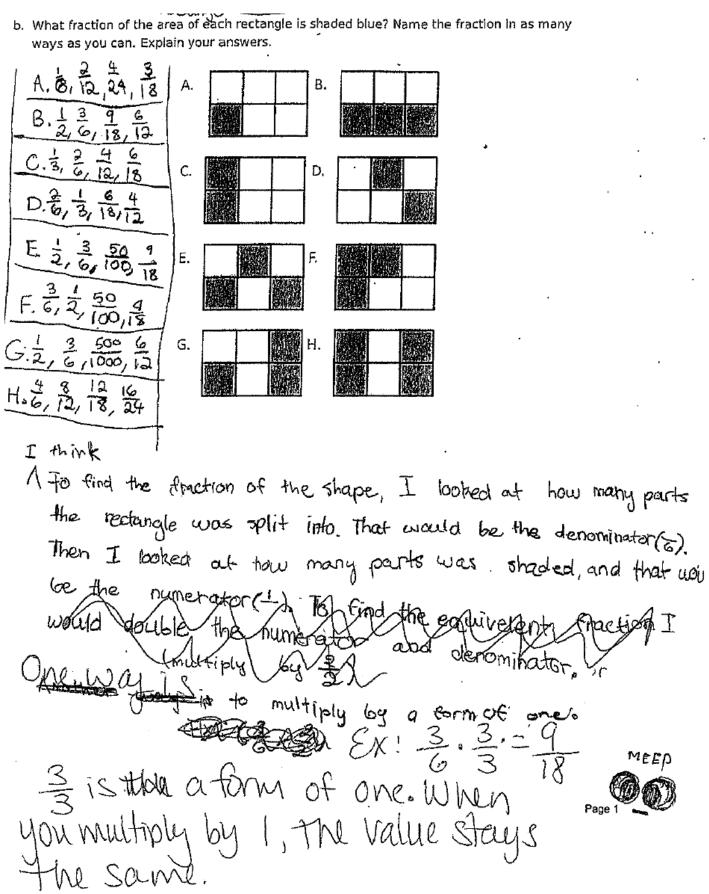
Student A



b. What fraction of the area of each rectangle is shaded blue? Name the fraction in as many ways as you can. Explain your answers.

A. $\frac{1}{6}, \frac{2}{12}, \frac{4}{24}, \frac{3}{18}$
B. $\frac{1}{2}, \frac{3}{6}, \frac{9}{18}, \frac{6}{12}$
C. $\frac{1}{3}, \frac{2}{6}, \frac{4}{12}, \frac{6}{18}$
D. $\frac{2}{6}, \frac{1}{3}, \frac{6}{18}, \frac{4}{12}$
E. $\frac{1}{2}, \frac{3}{6}, \frac{50}{100}, \frac{9}{18}$
F. $\frac{3}{6}, \frac{1}{2}, \frac{50}{100}, \frac{4}{18}$
G. $\frac{1}{2}, \frac{3}{6}, \frac{500}{1000}, \frac{6}{12}$
H. $\frac{4}{6}, \frac{8}{12}, \frac{12}{18}, \frac{16}{24}$

A. B. C. D. E. F. G. H.

I think To find the fraction of the shape, I looked at how many parts the rectangle was split into. That would be the denominator($\frac{}{6}$). Then I looked at how many parts was shaded, and that would be the numerator($\frac{1}{}$). ~~To find the equivalent fraction I would double the numerator and denominator, or (multiply by $\frac{2}{2}$)~~ One way is to multiply by a form of one. Ex: $\frac{3}{6} \cdot \frac{3}{3} = \frac{9}{18}$

MEEP

$\frac{3}{3}$ is a form of one. When you multiply by 1, the value stays the same.

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Commentary

This student's argument was categorized as **High Quality.**

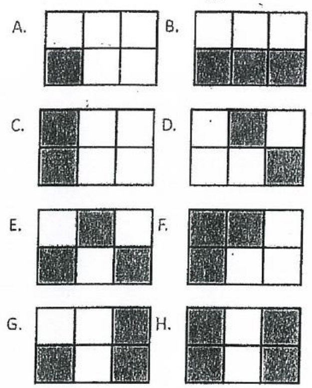
Student A's claim is that all of the fractions shown are equivalent to the corresponding fractions shown in the diagrams. Student A uses the multiplicative identity (multiplying by a form of 1) to show that 3/6 is equal to 9/18. The response generalizes why multiplying by a form of 1 results in an equivalent fraction.

Argumentation Components

Claim	Evidence
Implicit claim: all of the fractions shown in each part are equivalent	- 3/6 x 3/3 = 9/18 and - Given solutions
Warrants	**Language & Computation**
One way is to multiply by a form of 1. 3/3 is a form of 1. When you multiply by 1 the value stays the same.	The mathematical language used is precise and ideas flow clearly. Computations are correct.

Student B

on of the area of each rectangle is shaded ~~blue~~? gray Name the fraction in as many
can. Explain your answers.



A = $1/6 = 2/12 = 4/24 = 5/30 = 3/18 = 6/36$

B = $3/6 = 1/2$

C = $2/6 = 1/3$

D = $2/6 = 1/3$ = same as C

E = $3/6 = 1/2$ = same as B

F = $3/6 = 1/2$ = same as B

G = $3/6 = 1/2$ = same as B

H = $4/6 = 2/3 = 8/12 = \frac{12}{18} = 16/24 =$

I multplied by a form of one to get each fraction. I started by multipling by 2/2 then 3/3 then 4/4 then 5/5 and finally 6/6. For the first box, I counted the amout of squares in the retangle then I counted the shaded boxes. I got 1/6 for the first example. ~~I did my sequence of multipling fractions.~~

Commentary

This student's argument was categorized as **Adequate Quality.**

Student B's claim is that all of the fractions shown are equivalent to the corresponding fractions shown in the diagrams. Student B states that by multiplying by forms of 1, equivalent fractions are formed. However, the response does not explain why multiplying by a form of 1 results in an equivalent fraction. The argument could be strengthened by supporting the statement "multiplication by a form of 1" explaining that this multiplication does not change the value of the fractions (multiplicative identity).

Argumentation Components

Claim	Evidence
Implicit claim: all of the fractions shown in each part are equivalent	Given solutions
Warrants	**Language & Computation**
(See written explanation at bottom of student's work)	The mathematical language used is precise. Computations are correct.

Student C

b. What fraction of the area of each rectangle is shaded blue? Name the fraction in as many ways as you can. Explain your answers.

$A = \frac{1}{6} = \frac{2}{12} = \frac{4}{24} = \frac{8}{48} = \frac{16}{96} = \frac{32}{202}$

$B = \frac{1}{2}$ Same as E, F, G

$C = \frac{1}{3} = \frac{2}{6} = \frac{4}{12} = \frac{8}{24} = \frac{16}{48} = \frac{32}{96}$

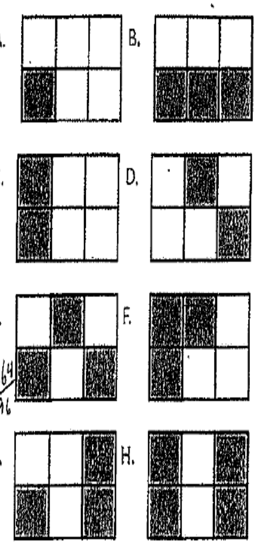
$D = \frac{1}{3}$ Same as C

$E = \frac{1}{2}$ Same as F and G

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

$G = \frac{1}{2} = \frac{3}{6} = \frac{2}{4} = \frac{6}{12} = \frac{8}{16} = \frac{10}{20}$

$H = \frac{2}{3} = \frac{4}{6} = \frac{8}{12} = \frac{16}{24} = \frac{32}{48} = \frac{64}{96}$



I got all the equivilent fractions because I multiplied all the fractions by $\frac{2}{2}$. To get my first solution by taking the one unit which was 6 boxes and counted all the colored boxes to get $\frac{1}{6}$ which means 1 out of 6 pieces. Then I multiplyed that by $\frac{2}{2}$.

Commentary

This student's argument was categorized as **Low Quality.**

Student C's claim is that all of the fractions shown are equivalent to the corresponding fractions shown in the diagrams. Student C only states that multiplying by 2/2 generates equivalent fractions. However, no support is given for why this approach is viable.

The argument would be strengthened by explaining that 2/2 is a form of 1 and therefore it can be used to find equivalent fractions. The argument should also contain an explanation for why multiplying by a form of 1 results in an equivalent fraction.

Argumentation Components

Claim	Evidence
Implicit claim: all of the fractions shown in each part are equivalent	Given solutions
Warrants	**Language & Computation**
(See written text at bottom of student's work)	The mathematical language used is precise. Computations are correct.

Rubric

Category	Description with Examples/Non-Examples	0	1	2	3
1. The **claim** presents the position being taken.	The claim is what is to be shown true or not true. *Example:* The fractions shown are equivalent to the corresponding fractions shown in the diagrams. *Non-example:* no equivalent fractions are given	No claim	Claim is included but not clear	Claim is clearly articulated	---
2. **Evidence** supports the claim.	Evidence can take the form of equations, tables, charts, diagrams, graphs, words, symbols, etc. It is one's "work" which provides the information to show something is true/false. *Example:* 3/6 x 3/3 = 9/18 *Non-example:* 3/6 = 9/18	No evidence	Minimal evidence is included, <u>or</u> evidence is unrelated to the claim, <u>or</u> major mathematical error(s) are present	Some evidence is missing <u>or</u> minor mathematical error(s) are present	Sufficient evidence is presented <u>and</u> there are no mathematica l error(s)
3. The **warrants** connect the evidence to the claim. (Note that some quality mathematical arguments may not include a warrant.)	Warrants can take the form of definitions, theorems, logical inferences, and agreed upon facts. Warrants collectively chain the evidence together to show the claim is true or false. *Example:* One way is to multiply by a form of 1. 3/3 is a form of 1. When you multiply by one the value stays the same. *Non-example:* Multiply by 3/3 to get an equivalent fraction.	No warrant	Minimal support for evidence, <u>or</u> warrant unrelated to evidence is included <u>or</u> major conceptual error(s) are evident	Some evidence lacks a necessary warrant <u>or</u> minor conceptual error(s) are evident	Sufficient warrant <u>and</u> no conceptual error(s)
4. The **mechanics** help convey precise ideas that flow.	The language used must be at a sufficient level of precision to support the argument and with sufficient clarity. *Example:* To find the fraction of the shape, I looked at how many parts the rectangle was split into. That is the denominator. Then I looked at how many parts were shaded in. That is the numerator. *Non-example:* To find the fraction I looked at the picture and how much was shaded. (Note the lack of precision with language.)	The language has major imprecisions <u>or</u> does not flow, thus the ideas are unclear	The language has some imprecisions <u>or</u> thus the ideas are somewhat clear, thus the ideas are somewhat unclear but can be inferred	The language is precise <u>and</u> the ideas flow clearly	---

Key Connecting Sorting Packet to Argumentation Resource Packet

Student number (Soring Packet)	Resource Packet Sample
1	C
2	B
3	A
4	
5	
6	
7	
8	
9	

Student number (Soring Packet)	Resource Packet Sample (category)
3	A (high)
2	B (adequate)
1	C (low)
	D ( )
	E ( )
	F ( )
	G ( )
	H ( )
	I ( )