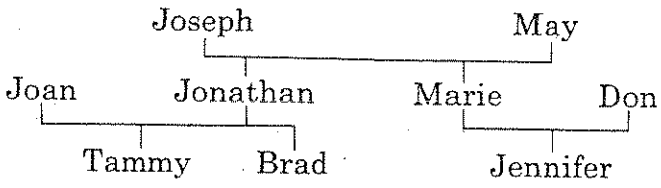
This family tree indicates that Jennifer is the daughter of Marie and Don.



We will use the following notation to describe relations in the family tree.

$m(x)$ means "the mother of x" (including mother-in-law), so m(Brad) is another name for "Joan."

$f(x)$ means "the father of x" (including father-in-law), so f(Marie) is another name for "Joseph."

$s(x)$ means "the sister of x" (including sister-in-law)

$b(x)$ means "the brother of x" (including brother-in-law)

Use the notation and family tree above to determine, if possible, the following people:

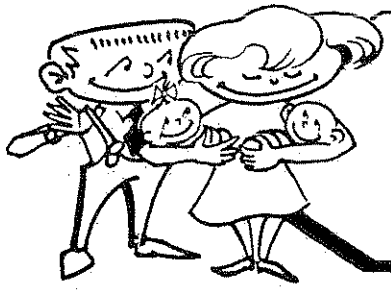
1. m(Tammy) = _____
2. f(Jonathan) = _____
3. f(Brad) = _____
4. s(Joan) = _____
5. b(Tammy) = _____
6. s(Jonathan) = _____
7. $f(s$(Jonathan)) = _____
8. $s(f$(Tammy)) = _____
9. $m(m$(Jennifer)) = _____
10. $f(f$(Jennifer)) = _____

11. Does $m(f$(Jennifer)) = $f(m$(Jennifer))? Yes No
    How do you know?

12. Does $m(s$(Brad)) = $s(m$(Brad))? Yes No
    How do you know?

From the *Mathematics Teacher*, October 1987

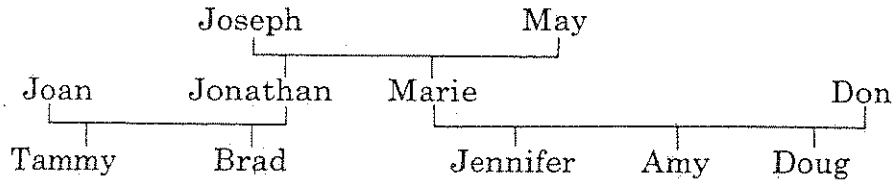
As the Tree Grows . . . What Then?



BIRTH ANNOUNCEMENT

Don and Marie are proud to announce the birth of twins Amy and Doug

Let's add these two children to the family tree:



Let's also add the following notation:

$d(x)$ = daughter of x (includes daughter-in-law), and

$sn(x)$ = son of x (includes son-in-law)

Use this new family tree to complete the following:

1. $s($_____$)$ = Tammy
2. $m($_____$)$ = May
3. $b($_____$)$ = Brad
4. $f($_____$)$ = Joseph
5. $s(f($_____$))$ = Marie
6. $f(b($_____$))$ = Don
7. Using our relation notation, list all the different ways you can think of to describe Jonathan. (One way is $b(f(\text{Doug}))$ = Jonathan.)
8. Using our relation notation, list all the different ways you can think of to describe Amy. (One way is $s(b(\text{Jennifer}))$.)

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