Are you ready for Beast Academy 3A?

> Before beginning Beast Academy 3A, a student should be comfortable adding and subtracting multi-digit numbers and must have a solid understanding of place value.

> A student ready for Beast Academy 3A should be able to answer at least 12 of the 16 problems below correctly.

Step 1. The student should try to answer every question without a calculator and without help.

Step 2. Check the student's answers using the solutions at the end of this document.

Step 3. The student should be given a second chance on problems that he or she answered incorrectly.

Fill in each blank below with the number that makes each equation true:

1. $3+41+47+9 =$ _____   **1.** _____

2. $32+16+8+4+2+1+1 =$ _____   **2.** _____

3. $555+666 =$ _____   **3.** _____

4. $524-325 =$ _____   **4.** _____

5. _____ $-12 = 75$ **5.** _____

6. $200+$ _____ $= 567$ **6.** _____

7. $800-82-17 = 800-$ _____   **7.** _____

8. $97+397 = 500-$ _____   **8.** _____

Write the following numbers with digits.

9. Five thousand, four hundred seventy-three.   **9.** _____

10. Sixteen thousand, fifty-two.   **10.** _____

Answer each:

11. What is the sum of the thousands digit and the tens digit in 56,987?

11. _____

12. Which number below has a ones digit that is greater than its ten-thousands digit?

90,287   26,532   41,902   47,658

12. _____

13. Dave has the same number of action figures as Richard. Which of the following *could* be the number of action figures Dave and Richard have **all together**?

15   23   46   79

13. _____

14. Chelsea played 5 basketball games. In each game, she scored an odd number of points. Which of the following *could* be the total number of points Chelsea scored in all 5 games?

10   22   33   40

14. _____

15. What digit could fill **both** blanks below to make this five-digit number greater than 74,500 but less than 75,600?

7__,4__9

15. _____

16. Akil was born 4 years before Kate. Ada is a year younger than Akil. If Ada is 9 years old, how many years old is Kate?

16. _____

Solutions

1. $3+41+47+9=(3+47)+(41+9)=50+50=\textbf{100}$.

2. $32+16+8+4+2+1+1=$
$(32+8)+(16+4)+(2+1+1)=40+20+4=\textbf{64}$.

— *or* —

If we reverse the order of the numbers we are adding
$(1+1+2+4+8+16+32)$, we are doubling each time we
add a number:

$1+1+2+4+8+16+32$
$=2+2+4+8+16+32$
$=\ \ 4+4+8+16+32$
$=\ \ \ \ 8+8+16+32$
$=\ \ \ \ \ 16+16+32$
$=\ \ \ \ \ \ \ 32+32$
$=\ \ \ \ \ \ \ \ \ \textbf{64}$.

3. $555+666=(500+50+5)+(600+60+6)$
$=(500+600)+(50+60)+(5+6)$
$=1{,}100+110+11=\textbf{1,221}$.

— *or* —

We could use the traditional addition algorithm:

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 555 \\ +666 \\ \hline \textbf{1,221} \end{array}$$

4. We are asked to find the difference, so we want to know
how much bigger 524 is than 325. If we add $325+200$, we
get 525. So, $325+200-1=524$.
This means that 524 is greater than 325 by $200-1=199$,
so $524-325=\textbf{199}$.

— *or* —

We could use the traditional subtraction algorithm:

$$\begin{array}{r} {\scriptstyle 1\ 14} \\ 5\ \not2\ \not4 \\ -325 \\ \hline 9 \end{array} \longrightarrow \begin{array}{r} {\scriptstyle 4\ 11\ 14} \\ \not5\ \not2\ \not4 \\ -325 \\ \hline \textbf{199} \end{array}$$

5. Since we subtract 12 from some number to get 75, our
answer is the number that is 12 *more than* 75.
$75+12=87$, so $\underline{\textbf{87}}-12=75$.

6. Since we add some number to 200 to get 567, that
number must be 200 less than 567.
$567-200=367$, so $200+\underline{\textbf{367}}=567$.

7. When we subtract 82 then subtract 17, we subtract a total
of $82+17=99$. So, $800-82-17=800-\underline{\textbf{99}}$.

8. $97+397=494$. So, we can write the question as
$494=500-\underline{\ \ \ }$. Since 494 is 6 less than 500,
$494=500-\underline{\textbf{6}}$.

— *or* —

97 is very close to 100, and 397 is very close to 400,
so the sum of $97+397$ is very close to $100+400=500$.
97 is 3 less than 100, and 397 is 3 less than 400.
If we add 97 to 397, we get a number that is $3+3=6$
less than $100+400=500$.
So, $97+397=500-\underline{\textbf{6}}$.

9. "Five thousand, four hundred seventy-three" is five
thousands, four hundreds, seven tens and three ones:
5,473.

10. "Sixteen thousand, fifty-two" is one ten-thousand, six
thousands, five tens, and two ones: **16,052**.

11. The thousands digit in 56,987 is 6. The tens digit in
56,987 is 8. So, the sum of the thousands digit and the
tens digit is $6+8=\textbf{14}$.

12. In each number, the ones digit is farthest to the right,
and the ten-thousands digit is farthest to the left. The
only number whose ones digit is greater than its ten-
thousands digit is **47,658**.

13. The sum of any number and itself is always even. For
example, $2+2=4$ and $3+3=6$. Richard and Dave have
the same number of action figures, so, all together,
they must have an even number of action figures. 46
is the only even number listed, so Richard and Dave
could have **46** action figures all together. If Richard and
Dave each have 23 action figures, they will have 46 all
together.

14. When we add two odd numbers, the result is always
even. When we add an even number and an odd
number, the result is always odd. So,
after 2 games, the total number of points Chelsea
scored was even (odd+odd=even).
After 3 games, the total number of points Chelsea
scored was odd (even+odd=odd).
After 4 games, the total number of points Chelsea
scored was even (odd+odd=even).
After 5 games, the total number of points Chelsea
scored was odd (even+odd=odd).
33 is the only odd answer choice.

15. Since the number is less than 75,600, the thousands
digit of 7_,4_9 must be 5 or smaller.
If we place a **5** in both blanks, 7$\underline{5}$,4$\underline{5}$9 is greater than
74,500 but less than 75,600.
If we place a 1, 2, 3, or 4 in both blanks, we get a
number that is less than 74,500, so **5** is the only
possible choice.

16. We start with the one age we are given: Ada is 9 years
old. We are also told Ada is a year younger than Akil,
so Akil is a year *older than* Ada: $9+1=10$ years old.
Akil was born 4 years before Kate, so Akil is 4 years
older than Kate. We subtract 4 years from Akil's age to
get Kate's age. This makes Kate $10-4=\textbf{6}$ years old.