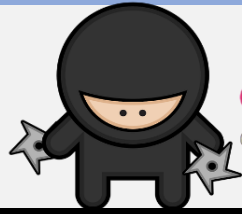


ARITHMETIC NINJA 1A

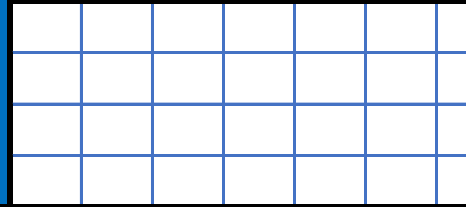


To Add Multiples of 10, 100 and 1000.



watch examples

$$400 + 5,000 + 60 =$$



1 $70 + 1,000 =$

2 $80 + 100 =$

3 $10 + 1,000 =$

4 $500 + 10 =$

5 $100 + 30 =$

6 $600 + 2,000 =$

7 $500 + 600 =$

8 $80 + 900 =$

9 $90 + 3,000 =$

10 $20 + 800 =$

11 $1,000 + 900 =$

12 $400 + 8,000 =$

13 $9,000 + 200 + 30 =$

14 $5,000 + 20 + 400 =$

15 $70 + 900 + 1,000 =$

16 $200 + 5,000 + 10 =$

17 $90 + 1,000 + 900 =$

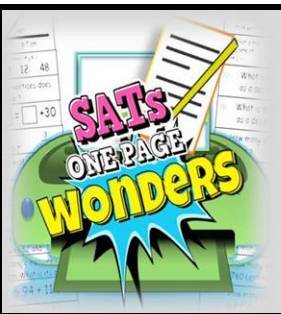
18 $200 + 40 + 6,000 =$

19 $10 + 200 + 3,000$

20 $100 + 2000 + 30 =$

21 $300 + 2000 + 10 =$

How I would explain it to someone else :



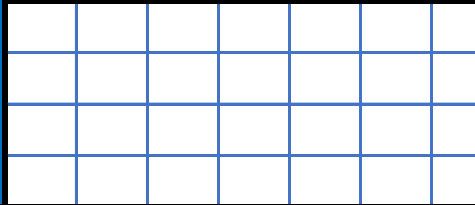
ANSWERS 1A

To Add Multiples of 10, 100 and 1000.



watch examples

$$400 + 5,000 + 60 =$$



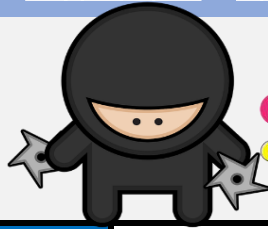
1	1,070	2	180	3	1,010
4	510	5	130	6	2,600
7	1,100	8	980	9	3,090
10	820	11	1,900	12	8,400
13	9,230	14	5,420	15	1,970
16	5,210	17	1,990	18	6,240
19	3,210	20	2,130	21	2,310

How many did you get correct?

ARITHMETIC NINJA 1B

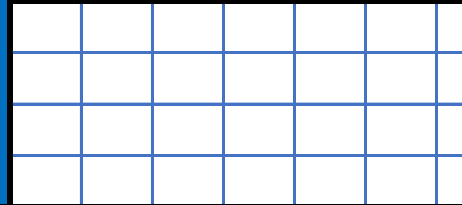


To Add a Three Digit & Four Digit Number



watch examples

$$\boxed{} = 556 + 1,982$$



1 $123 + 1,234 =$

2 $1,492 + 627 =$

3 $327 + 1,394 =$

4 $445 + 1,236 =$

5 $3,008 + 395 =$

6 $637 + 3,892 =$

7 $828 + 4,095 =$

8 $4625 + 637 =$

9 $971 + 7,512 =$

10 $\boxed{} = 2,944 + 783$

11 $\boxed{} = 248 + 1,670$

12 $\boxed{} = 782 + 9,629$

13 $\boxed{} = 3,173 + 771$

14 $\boxed{} = 444 + 1469$

15 $\boxed{} = 338 + 1,572$

16 $\boxed{} = 3,281 + 147$

17 $1,999 + 199 =$

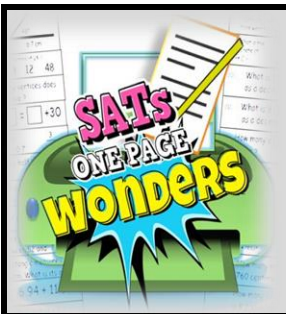
18 $\boxed{} = 237 + 1,817$

19 $1,010 + 101 =$

20 $\boxed{} = 1,954 + 752$

21 $707 + 7009 =$

How I would explain it to someone else :



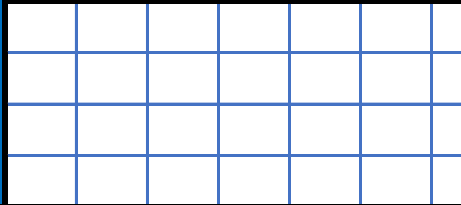
ANSWERS 1B

To Add a Three Digit
& Four Digit Number



watch examples

$$\square = 556 + 1,982$$



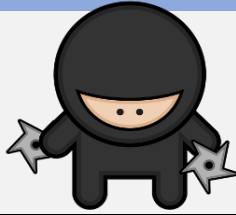
1	1,357	2	2,119	3	1,721
4	1,681	5	3,403	6	4,529
7	4,923	8	5,262	9	8,483
10	3,727	11	1,918	12	10,411
13	3,944	14	1,913	15	1,910
16	3,428	17	2,198	18	2,054
19	1,111	20	2,706	21	7,716

How many did you get correct?

ARITHMETIC NINJA 1C

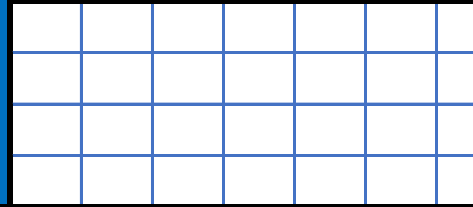


To Solve Sums involving Simple Subtraction



watch examples

$$\square + 400 = 923$$



1 $489 - 30 =$

2 $983 - 70 =$

3 $4720 - 110 =$

4 $\square + 100 = 621$

5 $532 - 420 =$

6 $675 - 50 =$

7 $924 - 500 =$

8 $\square + 200 = 562$

9 $970 - 80 =$

10 $\square - 300 = 256$

11 $724 - 50 =$

12 $23 + \square = 522$

13 $562 - 70 =$

14 $8,756 - 3000 =$

15 $\square + 80 = 515$

16 $813 - 700 =$

17 $1,480 - 90 =$

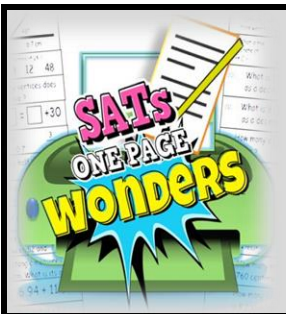
18 $\square - 6000 = 6438$

19 $\square - 280 = 200$

20 $\square - 450 = 1000$

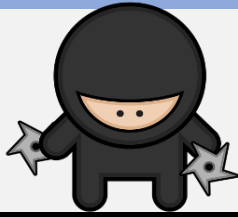
21 $\square - 3250 = 1940$

How I would explain to someone else why Q8, 12 and 15 are on the subtraction booster when they all contain an add?



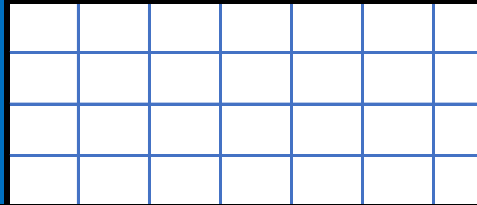
ANSWERS 1C

To Solve Sums involving Simple Subtraction



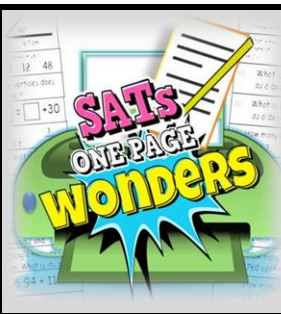
watch examples

$$\square + 400 = 923$$



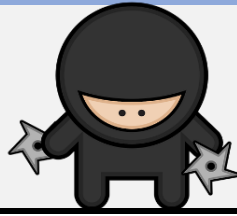
1	459	2	913	3	4,610
4	521	5	112	6	625
7	424	8	362	9	890
10	556	11	674	12	499
13	492	14	5,756	15	435
16	113	17	1,390	18	12,438
19	480	20	1,450	21	5,190

How I would explain to someone else why Q8, 12 and 15 are on the subtraction booster when they all contain an add?



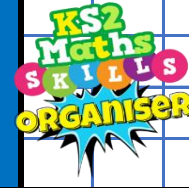
ARITHMETIC NINJA 1D

To complete subtraction sums where borrowing is required.



watch examples

$$20,005 - 6294 =$$



1 $5,447 - 679 =$

2 $4,792 - 398 =$

3 $6,728 - 239 =$

4 $3,662 - 706 =$

5 $6,843 - 764 =$

6 $2,941 - 456 =$

7 $1,111 - 222 =$

8 $5,253 - 695 =$

9 $6,607 - 438 =$

10 $2,670 - 790 =$

11 $5,577 - 939 =$

12 $8,593 - 815 =$

13 $8,757 - 971 =$

14 $4,903 - 555 =$

15 $7,727 - 808 =$

16 $9,845 - 569 =$

17 $3,684 - 992 =$

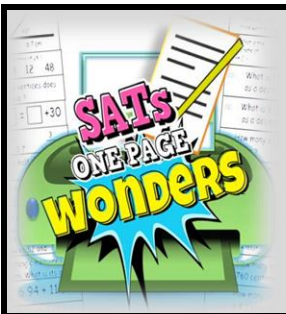
18 $5,006 - 338 =$

19 $8,004 - 736 =$

20 $9,874 - 387 =$

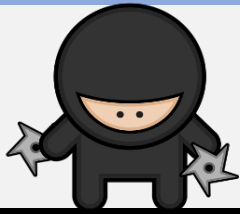
21 $14,007 - 6,668 =$

How I would explain borrowing to someone else?



ANSWERS 1D

To complete subtraction sums where borrowing is required.



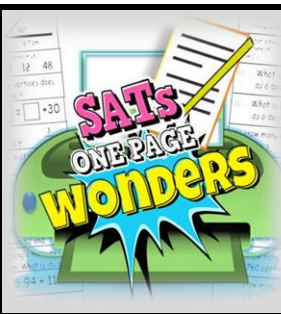
watch examples

$$20,005 - 6294 =$$



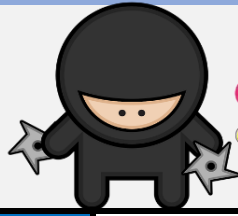
1	4,768	2	4,394	3	6,489
4	2,956	5	6,079	6	2,485
7	889	8	4,558	9	6,169
10	1,880	11	4,638	12	7,778
13	7,786	14	4,348	15	6,919
16	9,276	17	2,692	18	4,668
19	7,268	20	9,487	21	7,339

How I would explain borrowing to someone else?



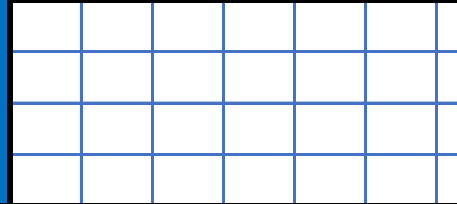
ARITHMETIC NINJA 1E

To Solve Mixed Addition and Subtraction Sums



watch examples

$978 + 587 =$



1 $2,781 + 496 =$

2 $7,409 - 946 =$

3 = $3,200 - 700$

4 = $5,100 + 800$

5 = $1,460 + 600$

6 $3,800 + 800 =$

7 = $4,250 - 400$

8 = $300 + 2,800$

9 $7,800 - 900 =$

10 $7,400 - 700 =$

11 = $800 + 9,600$

12 = $3,800 - 900$

13 = $4,900 - 1,300$

14 $700 + 8,500 =$

15 $2,690 - 700 =$

16 $4,787 - 2,992 =$

17 = $100 + 2,999$

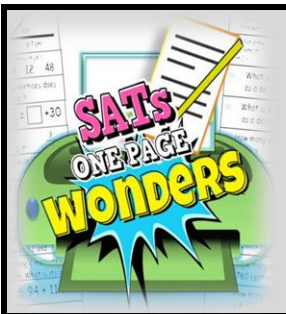
18 = $6,600 + 800$

19 $6,742 + 14,685 =$

20 $7,997 - 797 =$

21 = $400 + 9,998$

What advice would I give to other people when tackling mixed operation sums?



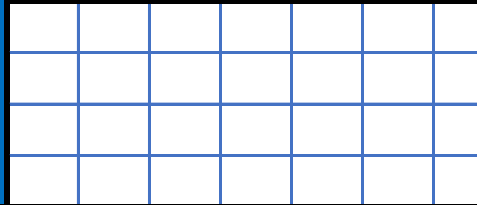
ANSWERS 1E

To Solve Mixed Addition and Subtraction Sums



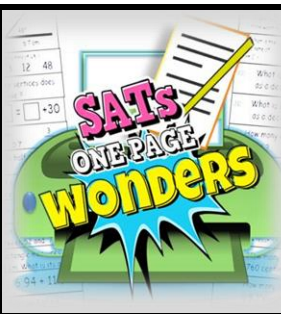
watch examples

$978 + 587 =$



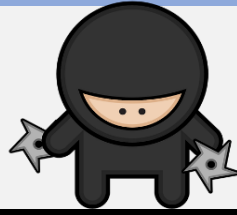
1	3,277	2	6,463	3	2,500
4	5,900	5	2,060	6	4,600
7	3,850	8	3,100	9	6,900
10	6,700	11	10,400	12	2,900
13	3,600	14	9,200	15	1,990
16	1,795	17	3,099	18	7,400
19	21,427	20	7,200	21	1,398

How many have you got correct?



ARITHMETIC NINJA 1F

To Work in Reverse to find a Missing Part of the Question



watch examples



$$\square + 890 = 9,400$$



1 $\square - 1000 = 1,620$

2 $\square - 10 = 695$

3 $\square - 40 = 5,389$

4 $\square - 1000 = 2,480$

5 $\square - 200 = 8,229$

6 $\square + 100 = 5,370$

7 $\square - 10 = 897$

8 $\square - 6,000 = 2,733$

9 $\square = 5,100 + 800$

10 $\square + 4,000 = 9,003$

11 $\square - 3,000 = 4,913$

12 $\square - 100 = 4,260$

13 $\square - 5,000 = 267$

14 $\square + 100 = 2,008$

15 $\square - 50 = 4,700$

16 $\square - 1,000 = 1,639$

17 $\square + 1,000 = 5,128$

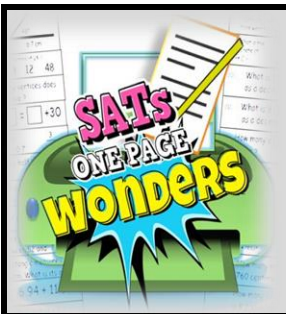
18 $\square + 3,000 = 7,218$

19 $\square - 1,460 = 2,946$

20 $\square + 1,460 = 2,946$

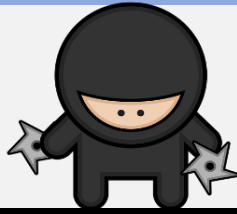
21 $\square + 9,090 = 9,980$

How would I explain to someone else why question 9 is slightly different than the others?



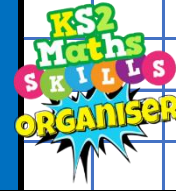
ANSWERS 1F

To Work in Reverse to find a Missing Part of the Question



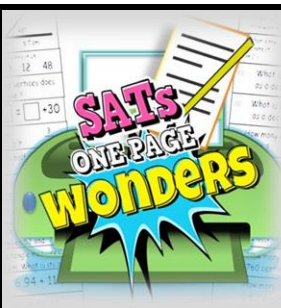
watch examples

$$\square + 890 = 9,400$$



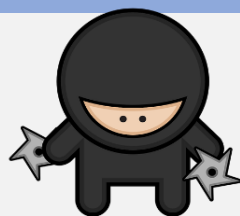
1	2,620	2	705	3	5,429
4	3,480	5	8,429	6	5,270
7	907	8	8,733	9	5,900
10	5,003	11	7,913	12	4,360
13	5,267	14	1,908	15	4,750
16	2,639	17	4,128	18	4,218
19	4,406	20	1,486	21	890

How many did you get correct?



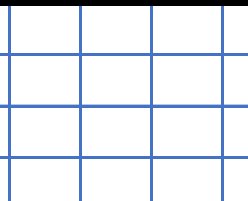
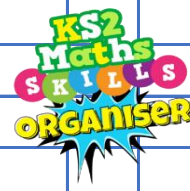
ARITHMETIC NINJA 1G

To Subtract a Decimal from a Whole Number



watch examples

$97 - 8.59 =$



1 $1 - 0.7 =$

2 $6 - 3.8 =$

3 $8 - 2.75 =$

4 $5 - 3.87 =$

5 $8 - 3.36 =$

6 $6 - 1.86 =$

7 $13 - 5.37 =$

8 $2 - \square = 0.68$

9 $\square - 4.45 = 5.55$

10 $1 - 0.73 =$

11 $8 - \square = 3.76$

12 $7 - 3.65 =$

13 $9 - 1.03 =$

14 $7 - \square = 1.43$

15 $9 - 6.92 =$

16 $20 - 11.58 =$

17 $27 - 5.01 =$

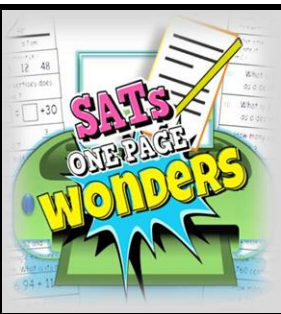
18 $\square - 3.44 = 7.56$

19 $12 - \square = 7.24$

20 $97 - 8.59 =$

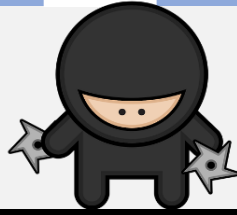
21 $9 - \square = 1.59$

Are there any mental strategies you can use? How could you link each question to a question about money?



ANSWERS 1G

To Subtract a Decimal from a Whole Number



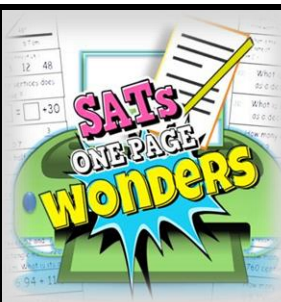
watch examples

$97 - 8.59 =$



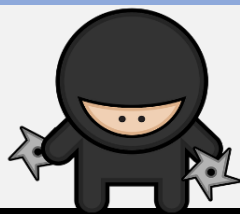
1	0.3	2	2.2	3	5.25
4	1.13	5	4.64	6	4.14
7	7.63	8	1.32	9	10
10	0.27	11	4.24	12	3.35
13	7.97	14	5.57	15	2.08
16	8.42	17	21.99	18	11
19	4.76	20	88.41	21	7.41

How many did you get correct?



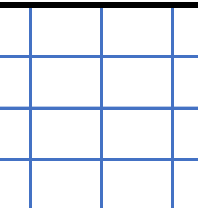
ARITHMETIC NINJA 1H

To Add & Subtract
Decimals with Different
Numbers of Decimal Points



watch examples

$$4.9 + 5.008 + 19.3 =$$



1 $4.8 + 5.67 =$

2 $24.6 - 23.07 =$

3 $41.9 + 7.936 =$

4 $9.366 - 2.18 =$

5 $9.8 + 7.83 =$

6 $34.565 - 28.9 =$

7 $35.48 - 6.765 =$

8 $24.98 - 23.99 =$

9 $84.543 - 6.12 =$

10 $36.563 + 6.76 =$

11 $2.45 + 3.672 =$

12 $40.065 - 13.98 =$

13 $30.1 - 27.204 =$

14 $30.204 - 27.1 =$

15 $117.2 + 1.172 =$

16 $34.908 - 33.99 =$

17 $12.63 + 12.777 =$

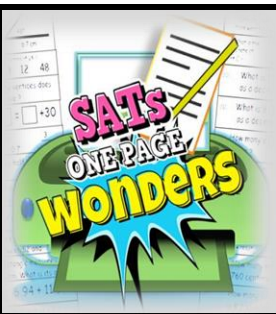
18 $50.1 - 33.062 =$

19 $6.461 + 3.5 + 8 =$

20 $5 + 4.9 + 3.985 =$

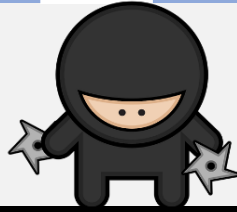
21 $3.9 + 6.002 + 21.7 =$

What advice would you give to someone who was trying to add or subtract decimals with different numbers of digits after the decimal point?



ANSWERS 1H

To Add & Subtract
Decimals with Different
Numbers of Decimal Points



watch examples

$$4.9 + 5.008 + 19.3 =$$

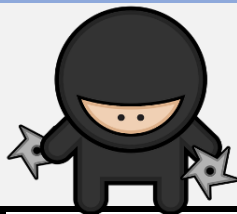


1	10.47	2	1.53	3	49.836
4	7.186	5	17.63	6	5.665
7	28.715	8	0.99	9	78.423
10	43.323	11	6.122	12	26.085
13	2.896	14	3.104	15	118.372
16	0.918	17	25.407	18	17.038
19	17.961	20	13.885	21	31.602

What advice would you give to someone who was trying to add or subtract decimals with different numbers of digits after the decimal point?

ARITHMETIC NINJA 2A

To Multiply a Two-Digit by a Single Digit Number



watch examples

$$\square = 9 \times 83$$



1 $21 \times 4 =$

2 $57 \times 5 =$

3 $32 \times 6 =$

4 $3 \times 47 =$

5 $98 \times 5 =$

6 $43 \times 6 =$

7 $3 \times 78 =$

8 $6 \times 47 =$

9 $43 \times 8 =$

10 $51 \times 9 =$

11 $7 \times 26 =$

12 $37 \times 8 =$

13 $39 \times 9 =$

14 $97 \times 6 =$

15 $42 \times 9 =$

16 $78 \times 9 =$

17 $96 \times 6 =$

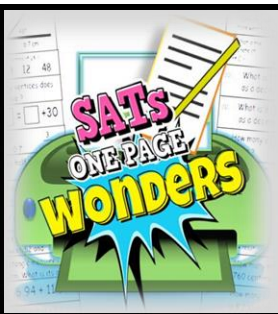
18 $8 \times 73 =$

19 $\square = 87 \times 4$

20 $\square = 95 \times 5$

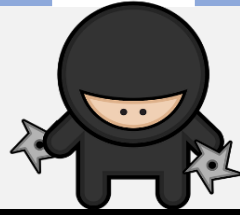
21 $\square = 7 \times 64$

What is different about the last three questions? Choose five timestables sums you find the hardest to remember and write them down three times each here:



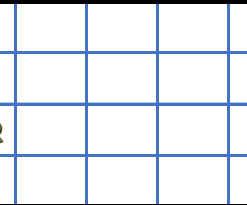
ANSWERS 2A

To Multiply a Two-Digit by a Single Digit Number



watch examples

$$\square = 9 \times 83$$



1	84	2	285	3	192
4	141	5	490	6	258
7	234	8	282	9	344
10	459	11	182	12	296
13	351	14	582	15	378
16	702	17	576	18	584
19	348	20	475	21	448

How many did you get correct?

ARITHMETIC NINJA 2B

To Multiply a Three-Digit by a Single Digit Number



watch examples

$$\square = 999 \times 8$$



1 $251 \times 4 =$

2 $603 \times 3 =$

3 $517 \times 3 =$

4 $6 \times 403 =$

5 $4 \times 624 =$

6 $246 \times 5 =$

7 $624 \times 5 =$

8 $6 \times 525 =$

9 $988 \times 3 =$

10 $403 \times 7 =$

11 $583 \times 4 =$

12 $603 \times 3 =$

13 $704 \times 2 =$

14 $5 \times 389 =$

15 $739 \times 4 =$

16 $790 \times 8 =$

17 $691 \times 7 =$

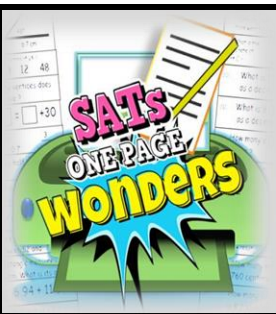
18 $992 \times 9 =$

19 $\square = 738 \times 6$

20 $\square = 999 \times 9$

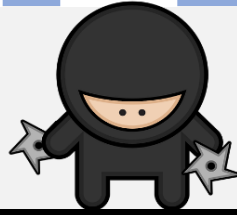
21 $\square = 987 \times 6$

What is different about the last three questions? Choose five timestables sums you find the hardest to remember and write them down three times each here:



ANSWERS 2B

To Multiply a Three-Digit by a Single Digit Number



watch examples

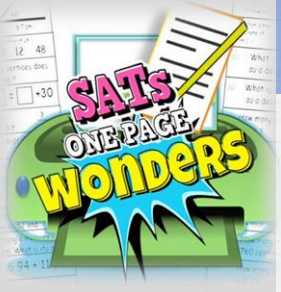
$$\square = 999 \times 8$$



1	1,004	2	1,809	3	1,551
4	2,418	5	2,496	6	1,230
7	3,120	8	3,150	9	2,964
10	2,821	11	2,332	12	1,809
13	1,408	14	1,945	15	2,956
16	6,320	17	4,837	18	8,928
19	4,428	20	8,991	21	5,922

How many did you get correct?

ARITHMETIC NINJA 2C

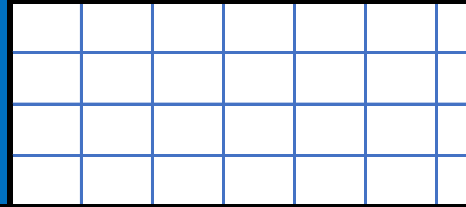


To Multiply Numbers together that are Multiples of Ten



watch examples

$$\square = 120 \times 9000$$



1 $20 \times 80 =$

2 $70 \times 20 =$

3 $30^2 =$

4 $50 \times 60 =$

5 $80 \times 900 =$

6 $120 \times 30 =$

7 $\square = 70 \times 30$

8 $80 \times 60 =$

9 $300 \times 90 =$

10 $120^2 =$

11 $500 \times 30 =$

12 $\square = 20 \times 90$

13 $40 \times 700 =$

14 $700 \times 50 =$

15 $600 \times 80 =$

16 $700 \times 300 =$

17 $500 \times 400 =$

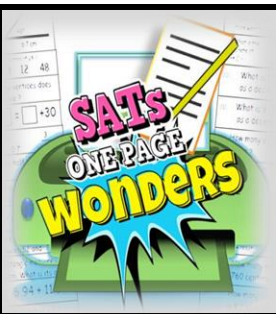
18 $1200 \times 80 =$

19 $\square = 20 \times 30 \times 40$

20 $\square = 120 \times 1100$

21 $\square = 800 \times 5000$

What advice would you give to other people trying to work these sums out? What is different about Q19?



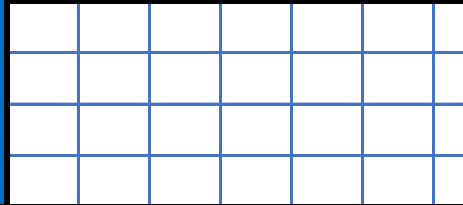
ANSWERS 2C

To Multiply Numbers together that are Multiples of Ten



watch examples

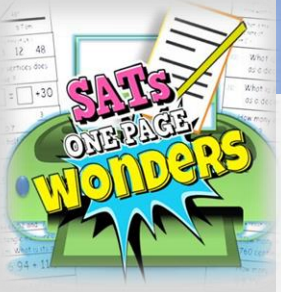
= 120×9000



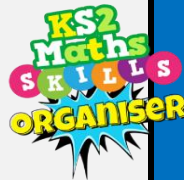
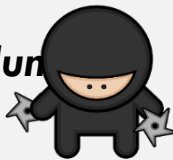
1	1,600	2	1,400	3	900
4	3,000	5	72,000	6	3,600
7	2,100	8	4,800	9	27,000
10	14,400	11	15,000	12	1,800
13	28,000	14	35,000	15	48,000
16	210,000	17	200,000	18	96,000
19	24,000	20	132,000	21	4,000,000

How many did you get correct?

ARITHMETIC NINJA 3A

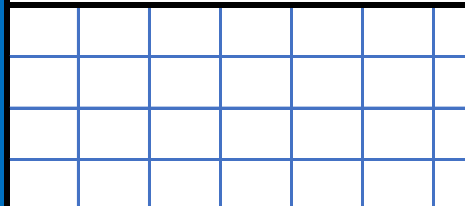


To Multiply a Three Digit Number by a Two Digit Number



watch examples

$$\square = 207 \times 34$$



1 $406 \times 14 =$

2 $313 \times 12 =$

3 $405 \times 18 =$

4 $409 \times 41 =$

5 $724 \times 26 =$

6 $936 \times 27 =$

7 $646 \times 35 =$

8 $952 \times 58 =$

9 $846 \times 82 =$

10 $637 \times 75 =$

11 $379 \times 48 =$

12 $749 \times 93 =$

13 $583 \times 65 =$

14 $721 \times 32 =$

15 $793 \times 73 =$

16 $804 \times 67 =$

17 $487 \times 62 =$

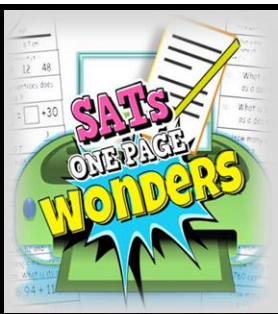
18 $839 \times 84 =$

19 $\square = 942 \times 58$

20 $\square = 507 \times 82$

21 $\square = 287 \times 23$

How would you describe how to set out your working to someone who had never done one of these before?



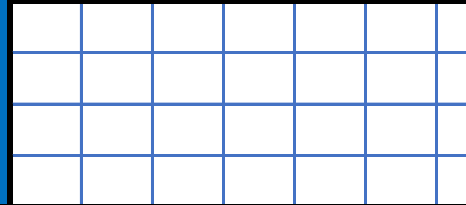
ANSWERS 3A

To Multiply a Three Digit Number by a Two Digit Number



watch examples

$$\square = 207 \times 34$$



1	5,684	2	3,756	3	7,290
4	16,769	5	18,824	6	25,272
7	22,610	8	55,216	9	69,372
10	47,775	11	18,192	12	69,657
13	37,895	14	23,072	15	57,889
16	53,868	17	30,194	18	70,476
19	54,636	20	41,574	21	6,601

How many did you get correct?

ARITHMETIC NINJA 3B

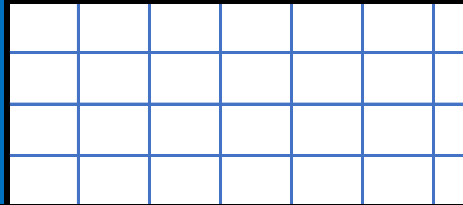


To Multiply a Four Digit Number by a Two Digit Number



watch examples

$$\boxed{} = 2073 \times 29$$



1 $4063 \times 14 =$

2 $3138 \times 12 =$

3 $4051 \times 23 =$

4 $5026 \times 41 =$

5 $6532 \times 24 =$

6 $1425 \times 37 =$

7 $7826 \times 63 =$

8 $7964 \times 86 =$

9 $9361 \times 74 =$

10 $2537 \times 45 =$

11 $9279 \times 38 =$

12 $1649 \times 83 =$

13 $5243 \times 43 =$

14 $6221 \times 27 =$

15 $9342 \times 25 =$

16 $9999 \times 99 =$

17 $3287 \times 62 =$

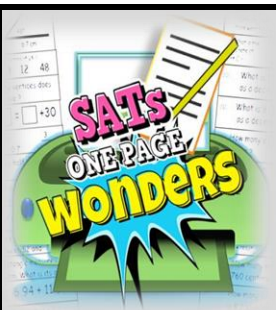
18 $2121 \times 21 =$

19 $\boxed{} = 1942 \times 58$

20 $\boxed{} = 2507 \times 82$

21 $\boxed{} = 4287 \times 26$

How would you describe how to set out your working to someone who had never done one of these before?



ANSWERS 3B

To Multiply a Four Digit Number by a Two Digit Number



watch examples

= 2073 × 29



1	56,882	2	37,656	3	93,173
4	206,066	5	156,768	6	52,725
7	493,038	8	684,904	9	692,714
10	114,165	11	352,602	12	136,867
13	225,449	14	167,967	15	233,550
16	989,901	17	203,794	18	44,541
19	112,636	20	205,574	21	111,462

How many did you get correct? Don't forget, these are two mark questions. So if you are not completely correct, you may still qualify for one mark.

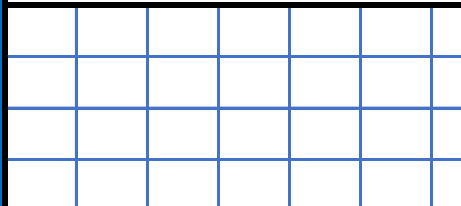


To Divide a Number by 1



watch examples

$17,000 \div 1 =$



1 $83 \div 1 =$

2 $552 \div 1 =$

3 $\div 1 = 761$

4 $982 \div 1 =$

5 $101 \div 1 =$

6 $34 \div 1 =$

7 $228 \div 1 =$

8 $429 \div \text{ } = 429$

9 $836 \div 1 =$

10 $\div 1 = 910$

11 $47 \div 1 =$

12 $\div 1 = 101$

13 $1,800 \div 1 =$

14 $706 \div 1 =$

15 $632 \div \text{ } = 632$

16 $374 \div 1 =$

17 $\div 1 = 139$

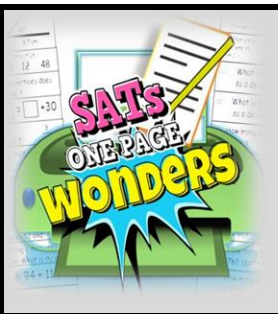
18 $14,000 \div 1 =$

19 $7,200 \div \text{ } = 7,200$

20 $1406 \div 1 =$

21 $\div 1 = 3.5$

What advice would I give to people trying to divide a number by 1?



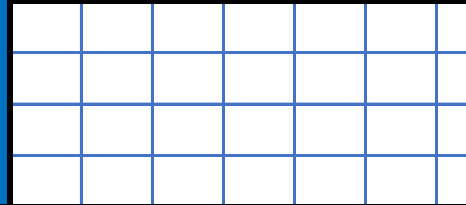
ANSWERS 4A

To Divide a Number by 1



watch examples

$17,000 \div 1 =$

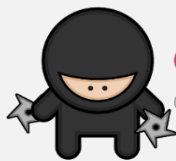


1	83	2	552	3	761
4	982	5	101	6	34
7	228	8	1	9	836
10	910	11	47	12	101
13	1,800	14	706	15	1
16	374	17	139	18	14,000
19	1	20	1,406	21	3.5

How many did you get correct?

ARITHMETIC NINJA 4B

To Divide by Recalling
Timestables Facts up
to 12×12



watch examples

$$110 \div \square = 11$$



1 $30 \div 5 =$

2 $24 \div 3 =$

3 $28 \div 2 =$

4 $\square \div 4 = 9$

5 $72 \div 6 =$

6 $35 \div 7 =$

7 $48 \div 6 =$

8 $44 \div \square = 4$

9 $18 \div 6 =$

10 $144 \div 12 =$

11 $35 \div 7 =$

12 $\square \div 7 = 8$

13 $27 \div \square = 3$

14 $60 \div 12 =$

15 $\square \div 7 = 12$

16 $132 \div 12 =$

17 $81 \div 9 =$

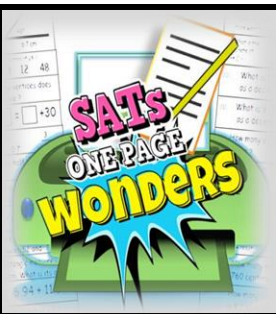
18 $45 \div 5 =$

19 $\square \div 9 = 7$

20 $32 \div 4 =$

21 $90 \div \square = 9$

Top Tip :



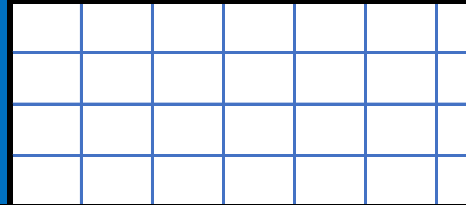
ANSWERS 4B

To Divide by Recalling
Timestables Facts up
to 12 x 12



watch examples

$110 \div \square = 11$

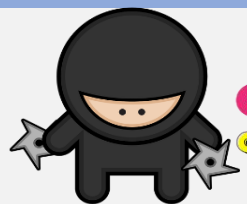


1	6	2	8	3	14
4	36	5	12	6	5
7	8	8	11	9	3
10	12	11	5	12	56
13	9	14	5	15	84
16	11	17	9	18	9
19	7	20	8	21	10

Knowing your timestables facts and recalling them quickly is absolutley vital!

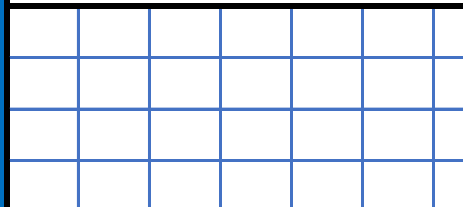
ARITHMETIC NINJA 4C

To Write a Remainder
as a Fraction
in a simple division



watch examples

$$95 \div 12 =$$



1 $13 \div 2 =$

2 $13 \div 4 =$

3 $8 \div 5 =$

4 $15 \div 4 =$

5 $12 \div 5 =$

6 $\frac{11}{2} =$

7 $22 \div 5 =$

8 $\frac{7}{3} =$

9 $9 \div 7 =$

10 $24 \div 7 =$

11 $25 \div 6 =$

12 $\frac{7}{4} =$

13 $\frac{33}{4} =$

14 $29 \div 3 =$

15 $\frac{30}{7} =$

16 $23 \div 8 =$

17 $\frac{59}{8} =$

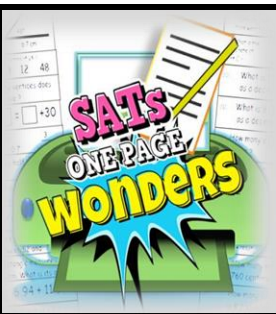
18 $36 \div 7 =$

19 $\frac{76}{9} =$

20 $53 \div 10 =$

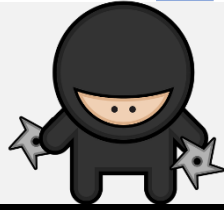
21 $\frac{85}{11} =$

How would I explain how to write a remainder as a fraction to somebody else?



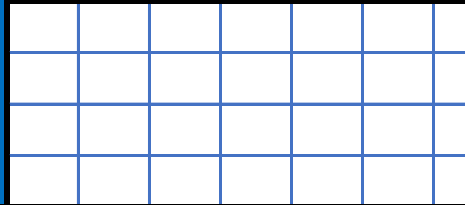
ANSWERS 4C

To Write a Remainder as a Fraction in a simple division



watch examples

$95 \div 12 =$



1	$6 \frac{1}{2}$	2	$3 \frac{1}{4}$	3	$1 \frac{3}{5}$
---	-----------------	---	-----------------	---	-----------------

4	$3 \frac{3}{4}$	5	$2 \frac{2}{5}$	6	$5 \frac{1}{2}$
---	-----------------	---	-----------------	---	-----------------

7	$4 \frac{2}{5}$	8	$2 \frac{1}{3}$	9	$1 \frac{2}{7}$
---	-----------------	---	-----------------	---	-----------------

10	$3 \frac{3}{7}$	11	$4 \frac{1}{6}$	12	$1 \frac{3}{4}$
----	-----------------	----	-----------------	----	-----------------

13	$8 \frac{1}{4}$	14	$9 \frac{2}{3}$	15	$4 \frac{2}{7}$
----	-----------------	----	-----------------	----	-----------------

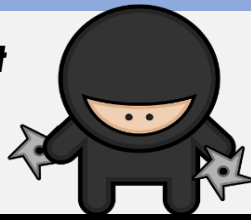
16	$2 \frac{7}{8}$	17	$7 \frac{3}{8}$	18	$5 \frac{1}{7}$
----	-----------------	----	-----------------	----	-----------------

19	$8 \frac{4}{9}$	20	$5 \frac{3}{10}$	21	$7 \frac{8}{11}$
----	-----------------	----	------------------	----	------------------

How many did you get correct?

ARITHMETIC NINJA 4D

To Divide a Three or Four Digit Number using a Bus Shelter (no final remainders)



watch examples

$$7,406 \div 7 =$$



1 $762 \div 6 =$

2 $824 \div 4 =$

3 $721 \div 7 =$

4 $984 \div 8 =$

5 $954 \div 3 =$

6 $536 \div 8 =$

7 $852 \div 4 =$

8 $522 \div 9 =$

9 $952 \div 7 =$

10 $645 \div 5 =$

11 $648 \div 6 =$

12 $936 \div 4 =$

13 $192 \div 8 =$

14 $245 \div 5 =$

15 $1,404 \div 4 =$

16 $1,872 \div 3 =$

17 $6,276 \div 6 =$

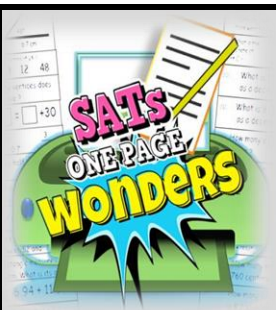
18 $8,768 \div 8 =$

19 $9,783 \div 9 =$

20 $7,888 \div 8 =$

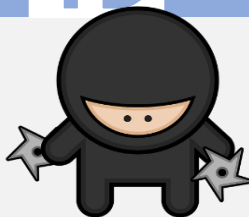
21 $9,054 \div 6 =$

How would you describe to other people how you do the bus shelter method if they had never done it before?



ANSWERS 4D

To Divide a Three or Four Digit Number using a Bus Shelter (no final remainders)



watch examples

$7,406 \div 7 =$

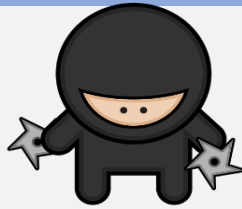


1	127	2	206	3	103
4	123	5	318	6	67
7	213	8	58	9	136
10	129	11	108	12	234
13	24	14	49	15	351
16	624	17	1,046	18	1,096
19	1,087	20	986	21	1,509

Being good at your timestables is absolutely vital for success here! How many did you get correct?

ARITHMETIC NINJA 4E

To Divide a Three or Four Digit Number using a Bus Shelter
(write remainder as fraction)



watch examples

$$8 \overline{)1111}$$



1

$$3 \overline{)146}$$

2

$$3 \overline{)296}$$

3

$$5 \overline{)316}$$

4

$$6 \overline{)212}$$

5

$$4 \overline{)374}$$

6

$$7 \overline{)486}$$

7

$$9 \overline{)323}$$

8

$$8 \overline{)283}$$

9

$$3 \overline{)379}$$

10

$$4 \overline{)517}$$

11

$$7 \overline{)934}$$

12

$$5 \overline{)743}$$

13

$$7 \overline{)748}$$

14

$$2 \overline{)269}$$

15

$$8 \overline{)923}$$

16

$$5 \overline{)416}$$

17

$$6 \overline{)5464}$$

18

$$8 \overline{)9351}$$

19

$$9 \overline{)2707}$$

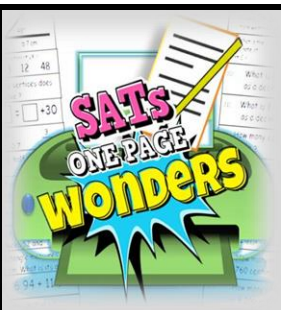
20

$$3 \overline{)9992}$$

21

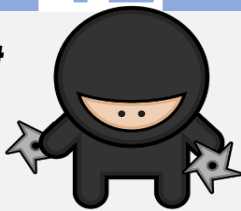
$$4 \overline{)9903}$$

How would you explain to someone who had never done bus shelter division before how to do it?



ANSWERS 4E

To Divide a Three or Four Digit Number using a Bus Shelter (write remainder as fraction)



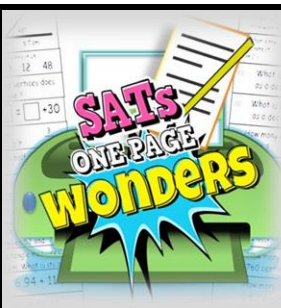
watch examples

$$8 \overline{)1111}$$



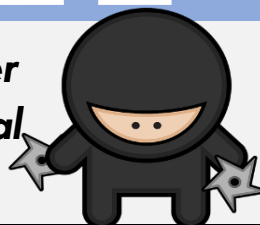
1	$48 \frac{2}{3}$	2	$98 \frac{2}{3}$	3	$63 \frac{1}{5}$
4	$35 \frac{2}{6}$	5	$93 \frac{2}{4}$	6	$69 \frac{3}{7}$
7	$35 \frac{8}{9}$	8	$35 \frac{3}{8}$	9	$126 \frac{1}{3}$
10	$129 \frac{1}{4}$	11	$133 \frac{3}{7}$	12	$148 \frac{3}{5}$
13	$106 \frac{6}{7}$	14	$134 \frac{1}{2}$	15	$115 \frac{3}{8}$
16	$83 \frac{1}{5}$	17	$910 \frac{4}{6}$	18	$1,168 \frac{7}{8}$
19	$300 \frac{7}{9}$	20	$3,330 \frac{2}{3}$	21	$2,475 \frac{3}{4}$

How many did you get correct?



ARITHMETIC NINJA 4F

To Divide a Three Digit Number by a Two Digit Number (no final remainders)



watch examples

$$14 \overline{)700}$$



1

$$13 \overline{)416}$$

2

$$23 \overline{)782}$$

3

$$31 \overline{)527}$$

4

$$23 \overline{)943}$$

5

$$24 \overline{)552}$$

6

$$28 \overline{)420}$$

7

$$29 \overline{)899}$$

8

$$36 \overline{)972}$$

9

$$18 \overline{)288}$$

10

$$21 \overline{)336}$$

11

$$33 \overline{)924}$$

12

$$19 \overline{)437}$$

13

$$26 \overline{)806}$$

14

$$32 \overline{)768}$$

15

$$18 \overline{)612}$$

16

$$27 \overline{)702}$$

17

$$62 \overline{)806}$$

18

$$42 \overline{)882}$$

19

$$39 \overline{)936}$$

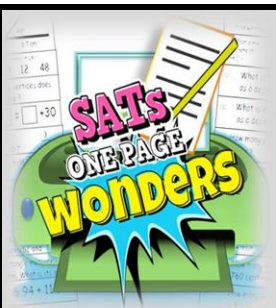
20

$$15 \overline{)270}$$

21

$$17 \overline{)714}$$

If someone had never used the chunking method before, how would you explain it to them?



ANSWERS 4F

To Divide a Three Digit Number by a Two Digit Number (no final remainders)



watch examples

$$14 \overline{)700}$$



1	32	2	34	3	17
4	41	5	23	6	15
7	31	8	27	9	16
10	16	11	28	12	23
13	31	14	24	15	34
16	26	17	13	18	21
19	24	20	18	21	42

How many did you get correct?

ARITHMETIC NINJA 4G

To Divide a Three Digit Number by a Two Digit Number (not too difficult with a bus shelter)



watch examples

$$18 \overline{)3798}$$



1

$$15 \overline{)1560}$$

2

$$21 \overline{)2142}$$

3

$$17 \overline{)1921}$$

4

$$12 \overline{)2436}$$

5

$$13 \overline{)1482}$$

6

$$15 \overline{)3000}$$

7

$$25 \overline{)3000}$$

8

$$33 \overline{)6699}$$

9

$$17 \overline{)3587}$$

10

$$46 \overline{)4692}$$

11

$$21 \overline{)2352}$$

12

$$24 \overline{)5040}$$

13

$$14 \overline{)3094}$$

14

$$16 \overline{)3424}$$

15

$$22 \overline{)4488}$$

16

$$11 \overline{)1111}$$

17

$$99 \overline{)9999}$$

18

$$25 \overline{)5625}$$

19

$$25 \overline{)2750}$$

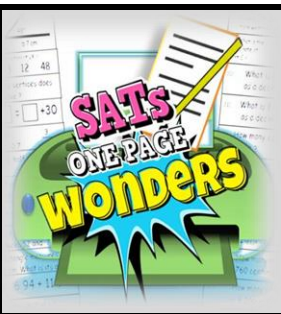
20

$$42 \overline{)8442}$$

21

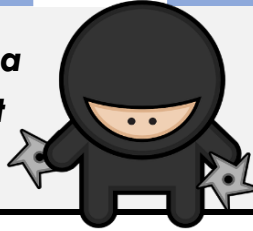
$$18 \overline{)3798}$$

How would you explain to someone who had never done bus shelter division before how to do it?



ANSWERS 4G

To Divide a Three Digit Number by a Two Digit Number (not too difficult with a bus shelter)



watch examples

$$18 \overline{)3798}$$



1	104	2	102	3	113
4	203	5	114	6	200
7	120	8	203	9	211
10	102	11	112	12	210
13	221	14	214	15	204
16	101	17	101	18	225
19	110	20	201	21	211

How many did you get correct?

ARITHMETIC NINJA 4H

To Divide a Four Digit Number by a Two Digit Number using the Chunking Method (write remainders as fractions)



watch examples

$$24 \overline{)9,675}$$



1 $23 \overline{)2,580}$

2 $32 \overline{)3,429}$

3 $43 \overline{)8,816}$

4 $36 \overline{)7,460}$

5 $24 \overline{)7,446}$

6 $26 \overline{)8,322}$

7 $25 \overline{)8,178}$

8 $27 \overline{)6,491}$

9 $21 \overline{)2,944}$

10 $16 \overline{)2,268}$

11 $15 \overline{)3,029}$

12 $31 \overline{)6,549}$

13 $25 \overline{)7,661}$

14 $18 \overline{)5,497}$

15 $16 \overline{)3,394}$

16 $27 \overline{)8,433}$

17 $22 \overline{)7,309}$

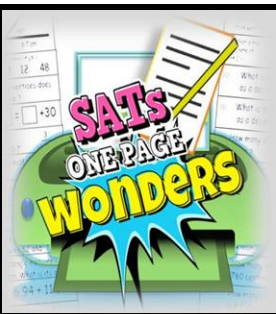
18 $36 \overline{)8,112}$

19 $24 \overline{)9,675}$

20 $14 \overline{)5,685}$

21 $13 \overline{)6,523}$

How would you explain to someone who had never done the chunking method before, what it is? What are "chunks"? What do you do with them? What do you do if there is a remainder left over?



ANSWERS 4H

To Divide a Four Digit Number by a Two Digit Number using the Chunking Method (write remainders as fractions)



watch examples

$$24 \overline{)9,675}$$

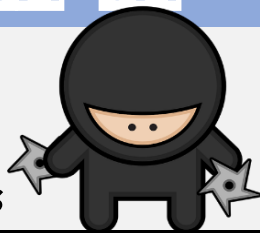


1	$112 \frac{4}{23}$	2	$107 \frac{5}{32}$	3	$205 \frac{1}{43}$
4	$207 \frac{8}{36}$	5	$310 \frac{6}{24}$	6	$320 \frac{2}{26}$
7	$327 \frac{3}{25}$	8	$240 \frac{11}{27}$	9	$140 \frac{4}{21}$
10	$141 \frac{12}{16}$	11	$201 \frac{14}{15}$	12	$211 \frac{8}{31}$
13	$306 \frac{11}{25}$	14	$305 \frac{7}{18}$	15	$212 \frac{2}{16}$
16	$312 \frac{9}{27}$	17	$332 \frac{5}{22}$	18	$225 \frac{12}{36}$
19	$403 \frac{3}{24}$	20	$406 \frac{1}{14}$	21	$501 \frac{10}{13}$

How would you explain to someone who had never done the chunking method before, what it is? What are "chunks"? What do you do with them? What do you do if there is a remainder left over?

ARITHMETIC NINJA 5A

To Add & Subtract
Decimals with Different
Numbers of Decimal Points



watch examples

$$4.9 + 5.008 + 19.3 =$$



1 $4.8 + 5.67 =$

2 $24.6 - 23.07 =$

3 $41.9 + 7.936 =$

4 $9.366 - 2.18 =$

5 $9.8 + 7.83 =$

6 $34.565 - 28.9 =$

7 $35.48 - 6.765 =$

8 $24.98 - 23.99 =$

9 $84.543 - 6.12 =$

10 $36.563 + 6.76 =$

11 $2.45 + 3.672 =$

12 $40.065 - 13.98 =$

13 $30.1 - 27.204 =$

14 $30.204 - 27.1 =$

15 $117.2 + 1.172 =$

16 $34.908 - 33.99 =$

17 $12.63 + 12.777 =$

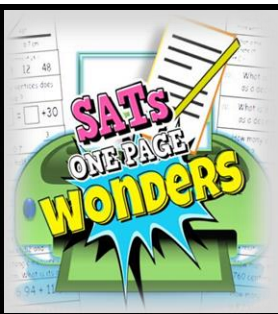
18 $50.1 - 33.062 =$

19 $6.461 + 3.5 + 8 =$

20 $5 + 4.9 + 3.985 =$

21 $3.9 + 6.002 + 21.7 =$

What advice would you give to someone who was trying to add or subtract decimals with different numbers of digits after the decimal point?



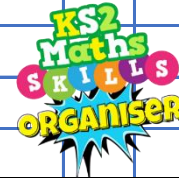
ANSWERS 5A

To Add & Subtract
Decimals with Different
Numbers of Decimal Points



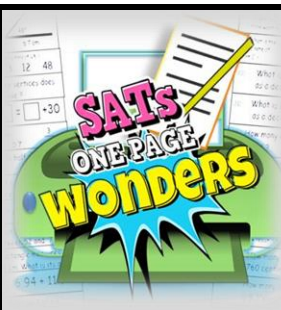
watch examples

$$4.9 + 5.008 + 19.3 =$$



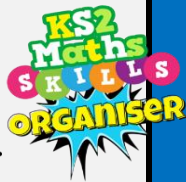
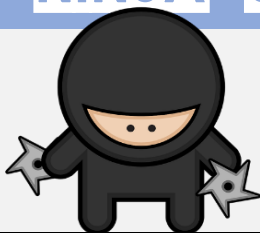
1	10.47	2	1.53	3	49.836
4	7.186	5	17.63	6	5.665
7	28.715	8	0.99	9	78.423
10	43.323	11	6.122	12	26.085
13	2.896	14	3.104	15	118.372
16	0.918	17	25.407	18	17.038
19	17.961	20	13.885	21	31.602

What advice would you give to someone who was trying to add or subtract decimals with different numbers of digits after the decimal point?



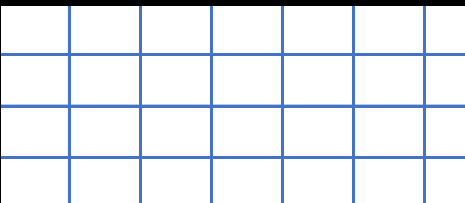
ARITHMETIC NINJA 5B

To Multiply 15 by a Decimal



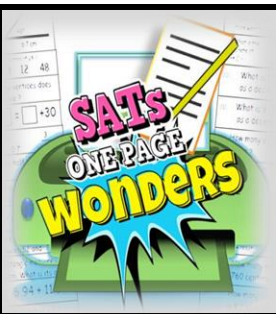
watch examples

$15 \times 2.6 =$



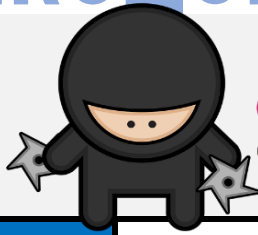
1	$15 \times 2.8 =$	2	$15 \times 4.6 =$	3	$15 \times 2.2 =$
4	$15 \times 9.6 =$	5	$8.4 \times 15 =$	6	$15 \times 6.6 =$
7	$15 \times 7.6 =$	8	$15 \times 5.2 =$	9	$15 \times 3.8 =$
10	$4.4 \times 15 =$	11	$15 \times 10.6 =$	12	$5.6 \times 15 =$
13	$15 \times 12.6 =$	14	$15 \times 1.8 =$	15	$15 \times 4.5 =$
16	$8.3 \times 15 =$	17	$15 \times 7.5 =$	18	$4.1 \times 15 =$
19	$*18 \times 2.4 =$	20	$*42 \times 3.2 =$	21	$*34 \times 5.6 =$

Explain how there are different methods of getting the same answer. Method 1: Find 10 lots of the number and then half it for 5 lots and ADD the two answers together for 15 lots. OR Method: Take out the decimal point, do a magic zero method for long multiplication and then put the decimal point back in at the end.



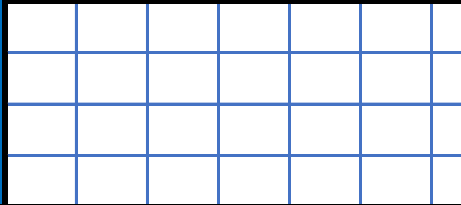
ANSWERS 5B

To Multiply 15 by a Decimal



watch examples

$15 \times 2.6 =$



1	42	2	69	3	33
4	144	5	126	6	99
7	114	8	78	9	57
10	66	11	159	12	84
13	189	14	27	15	67.5
16	124.5	17	112.5	18	61.5
19	43.2	20	134.4	21	190.4

How many did you get correct?

ARITHMETIC NINJA 5C

To Multiply a Multiple of 100 by
a Single Digit Decimal



watch examples

$$0.3 \times 500 =$$



1 $0.8 \times 600 =$

2 $0.7 \times 500 =$

3 $0.2 \times 400 =$

4 $0.1 \times 700 =$

5 $0.3 \times 200 =$

6 $0.4 \times 900 =$

7 $600 \times 0.2 =$

8 $0.4 \times 300 =$

9 $900 \times 0.7 =$

10 $0.5 \times 200 =$

11 $0.6 \times 600 =$

12 $0.5 \times 800 =$

13 $0.7 \times 400 =$

14 $300 \times 0.5 =$

15 $0.3 \times 500 =$

16 $1200 \times 0.8 =$

17 $0.2 \times 1300 =$

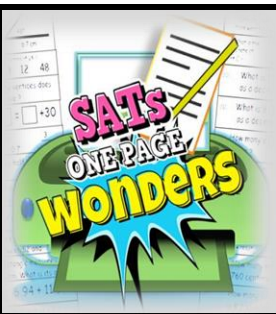
18 $1500 \times 0.4 =$

19 $2000 \times 0.7 =$

20 $0.9 \times 2200 =$

21 $0.3 \times 11,100 =$

How would you explain the quick and easy method doing these to someone who had never done one before?



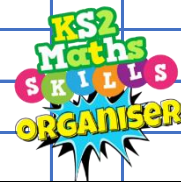
ANSWERS 5C

To Multiply a Multiple of 100 by a Single Digit Decimal



watch examples

$0.3 \times 500 =$



1	480	2	350	3	80
4	70	5	60	6	360
7	120	8	120	9	630
10	100	11	360	12	400
13	280	14	150	15	150
16	960	17	260	18	600
19	1,400	20	1,980	21	3,330

How many did you get correct?

ARITHMETIC NINJA 6A

To Find Simple Percentages such as 10%, 5%, 20%, 30%, 50%



watch examples

$$80\% \text{ of } 3,300 =$$



1 $10\% \text{ of } 150 =$

2 $10\% \text{ of } 640 =$

3 $10\% \text{ of } 890 =$

4 $20\% \text{ of } 180 =$

5 $5\% \text{ of } 260 =$

6 $50\% \text{ of } 470 =$

7 $10\% \text{ of } 7,600 =$

8 $30\% \text{ of } 340 =$

9 $25\% \times 600 =$

10 $50\% \text{ of } 770 =$

11 $20\% \text{ of } 460 =$

12 $60\% \times 500 =$

13 $5\% \text{ of } 540 =$

14 $70\% \text{ of } 120 =$

15 $20\% \text{ of } 3,200 =$

16 $50\% \text{ of } 720 =$

17 $30\% \times 5,800 =$

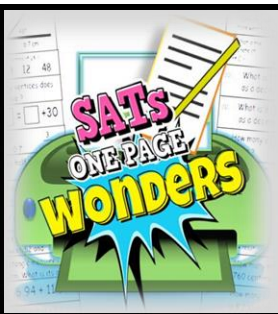
18 $5\% \text{ of } 9,200 =$

19 $60\% \times 810 =$

20 $25\% \text{ of } 8,800 =$

21 $90\% \times 9,700 =$

What advice would you give to people trying to find a basic percentage? Are there different rules you can think of for 10%, 25% and 50%? Are there two different ways to find 50% of a number?



ANSWERS 6A

To Find Simple Percentages such as 10%, 5%, 20%, 30%, 50%



watch examples

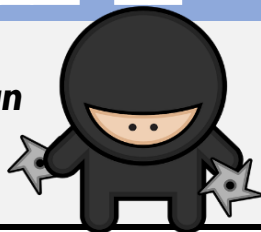
80% of 3,300 =

1	15	2	64	3	89
4	36	5	13	6	235
7	760	8	102	9	150
10	385	11	92	12	300
13	27	14	84	15	640
16	360	17	1,740	18	460
19	486	20	2,200	21	8,730

How many did you get correct?

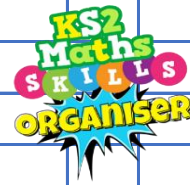
ARITHMETIC NINJA 6B

To Find a Percentage Less than 10% (by Scaling up 1%)



watch examples

$$9\% \times 7,000 =$$



1 1% of 400 =

2 1% of 600 =

3 2% of 300 =

4 3% of 900 =

5 4% of 200 =

6 5% of 460 =

7 $7\% \times 700 =$

8 9% of 500 =

9 $6\% \times 800 =$

10 2% of 4,200 =

11 8% of 900 =

12 3% of 400 =

13 5% of 850 =

14 $4\% \times 400 =$

15 8% of 300 =

16 $7\% \times 600 =$

17 $6\% \times 600 =$

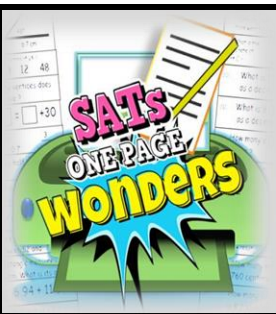
18 5% of 200 =

19 6% of 8,000 =

20 3% of 5,000 =

21 $9\% \times 7,000 =$

Can you describe a method you could use that would work every time, when trying to find a percentage less than 10%?



ANSWERS 6B

To Find a Percentage Less than 10% (by Scaling up 1%)



watch examples

$$9\% \times 7,000 =$$



1	4	2	6	3	6
4	27	5	8	6	23
7	49	8	45	9	48
10	84	11	72	12	12
13	42.5	14	16	15	24
16	42	17	36	18	10
19	480	20	150	21	630

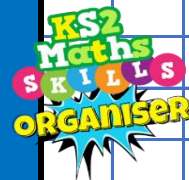
How many did you get correct?

ARITHMETIC NINJA 6C

To Find Larger Percentages such as 45%, 55%, 65%, 85%



watch examples



$$85\% \times 7,000 =$$



1 5% of 4,000 =

2 15% of 3,000 =

3 35% of 5,000 =

4 55% of 2,000 =

5 75% of 6,000 =

6 95% of 8,000 =

7 45% of 9,000 =

8 $35\% \times 400 =$

9 25% of 7,000 =

10 $65\% \times 6,000 =$

11 55% of 2,000 =

12 45% of 3,000 =

13 $35\% \times 8,000 =$

14 15% of 9,200 =

15 55% of 500 =

16 45% of 7,000 =

17 $35\% \times 5,000 =$

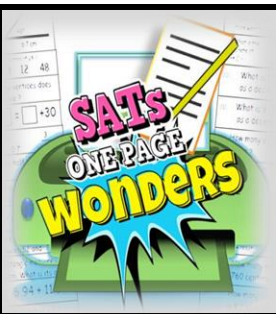
18 $65\% \times 9,000 =$

19 $65\% \times 10,000 =$

20 25% of 4200 =

21 95% of 12,000 =

Can you describe two different ways that you can work put 95% of a number :



ANSWERS 6C

watch examples

$$85\% \times 7,000 =$$

To Find Larger Percentages such as 45%, 55%, 65%, 85%



1	200	2	450	3	1,750
4	1,100	5	4,500	6	7,600
7	4,050	8	140	9	1,750
10	3,900	11	1,100	12	1,350
13	2,800	14	1,380	15	275
16	3,150	17	1,750	18	5,850
19	6,500	20	1,050	21	11,400

How many did you get correct?

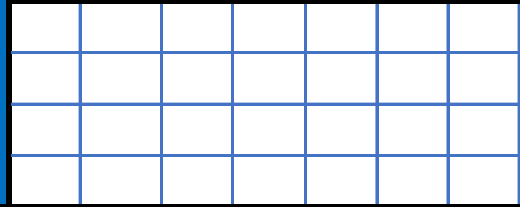
ARITHMETIC NINJA 7A

To Multiply a Whole Number by 100 or 1000



watch examples

$$\boxed{} \times 1,000 = 6,109,000$$



1 $2,453 \times 1,000 =$

2 $8,129 \times 1,000 =$

3 $2,453 \times 100 =$

4 $812 \times 1,000 =$

5 $\boxed{} \times 1,000 = 4,906,000$

6 $1,439 \times 1,000 =$

7 $1,000 \times 6,720 =$

8 $1,010 \times 100 =$

9 $9,316 \times \boxed{} = 9,316,000$

10 $\boxed{} \times 1,000 = 2,453,000$

11 $7,200 \times 1,000 =$

12 $100 \times 1,249 =$

13 $6,688 \times \boxed{} = 668,800$

14 $\boxed{} \times 100 = 6,953,000$

15 $6,601 \times 1,000 =$

16 $727 \times 100 =$

17 $1,000 \times 82 =$

18 $5,505 \times 1,000 =$

19 $1,000 \times 7,003 =$

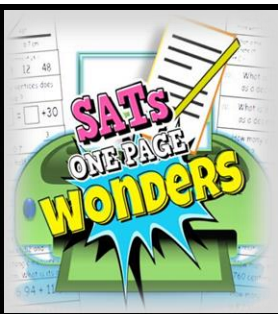
20 $\boxed{} \times 4,263 = 426,300$

21 $9,020 \times 100 =$

Top Tip : Remember the Cha Cha Slide song...Instead of "slide to the left, slide to the right"; it's "times to the left, divide to the right". This can help you remember which way to move the digits.

Try singing the different words to the real song here

<https://www.youtube.com/watch?v=wZv62ShoStY>




ANSWERS 7A

To Multiply a Whole Number by 100 or 1000



watch examples

× 1,000 = 6,109,000



1	2,453,000	2	8,129,000	3	245,300
4	812,000	5	4,906	6	1,439,000
7	6,720,000	8	101,000	9	1,000
10	2,453	11	7,200,000	12	124,900
13	100	14	69,530	15	6,601,000
16	72,700	17	82,000	18	5,505,000
19	7,003,000	20	100	21	902,000

Top Tip : Remember the Cha Cha Slide song...Instead of "slide to the left, slide to the right"; it's "times to the left, divide to the right". This can help you remember which way to move the digits.
 Try singing the different words to the real song here <https://www.youtube.com/watch?v=wZv62ShoStY>

ARITHMETIC NINJA 7B

To Multiply or Divide
a Decimal by
10, 100 or 1000



watch examples

$$0.49 \div 1,000 =$$



1 $3.9 \div 100 =$

2 $0.7 \div 1,000 =$

3 $0.09 \times 100 =$

4 $8.2 \div 1,000 =$

5 $26.8 \times 100 =$

6 $4.9 \div 1,000 =$

7 $3.27 \div 1,000 =$

8 $4.31 \times 1,000 =$

9 $25.3 \div 1,000 =$

10 $2.7 \times 1,000 =$

11 $5.9 \times 100 =$

12 $16.3 \div 100 =$

13 $55.1 \div 10 =$

14 $0.91 \div 10 =$

15 $6.88 \times 1,000 =$

16 $8.9 \times 1,000 =$

17 $327 \div 1,000 =$

18 $0.31 \times 1,000 =$

19 $26.3 \div 1,000 =$

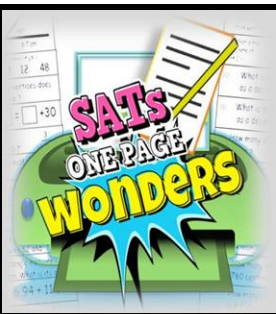
20 $0.0051 \times 100 =$

21 $3.8 \div 1,000 =$

Top Tip : Remember the Cha Cha Slide song...Instead of "slide to the left, slide to the right"; it's "times to the left, divide to the right". This can help you remember which way to move the digits.

Try singing the different words to the real song here

<https://www.youtube.com/watch?v=wZv62ShoStY>



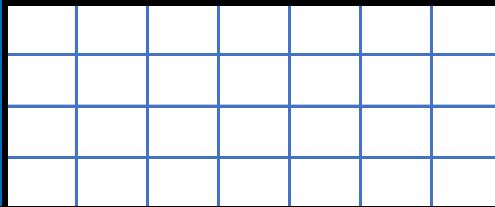
ANSWERS 7B

To Multiply or Divide
a Decimal by
10, 100 or 1000



watch examples

$$0.49 \div 1,000 =$$



1	0.039	2	0.0007	3	9 or 9.0
4	0.0082	5	2,680	6	0.0049
7	0.00327	8	4,310	9	0.0253
10	2,700	11	590	12	0.163
13	5.51	14	0.091	15	6,880
16	8,900	17	0.327	18	310
19	0.0263	20	0.51	21	0.0038

Top Tip : Remember the Cha Cha Slide song...Instead of "slide to the left, slide to the right"; it's "times to the left, divide to the right". This can help you remember which way to move the digits.

Try singing the different words to the real song here

<https://www.youtube.com/watch?v=wZv62ShoStY>

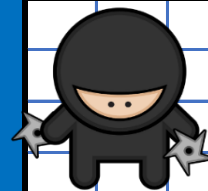
ARITHMETIC NINJA 8A

To Add Fractions with the Same Denominators



watch examples

$$\frac{12}{9} + \frac{4}{9} =$$



1

$$\frac{1}{5} + \frac{1}{5} =$$

2

$$\frac{2}{6} + \frac{1}{6} =$$

3

$$\frac{3}{8} + \frac{4}{8} =$$

4

$$\frac{1}{6} + \frac{4}{6} =$$

5

$$\frac{3}{9} + \frac{4}{9} =$$

6

$$\frac{4}{11} + \frac{2}{11} =$$

7

$$\frac{1}{5} + \frac{3}{5} =$$

8

$$\frac{3}{10} + \frac{5}{10} =$$

9

$$\frac{6}{13} + \frac{5}{13} =$$

10

$$\frac{2}{7} + \frac{3}{7} =$$

11

$$\frac{11}{25} + \frac{6}{25} =$$

12

$$\frac{3}{11} + \frac{4}{11} =$$

13

$$\frac{1}{7} + \frac{6}{7} =$$

14

$$\frac{3}{5} + \frac{4}{5} =$$

15

$$\frac{6}{10} + \frac{8}{10} =$$

16

$$\frac{4}{3} + \frac{1}{3} =$$

17

$$\frac{7}{10} + \frac{6}{10} =$$

18

$$\frac{5}{4} + \frac{1}{4} =$$

19

$$\frac{10}{12} + \frac{5}{12} =$$

20

$$\frac{5}{7} + \frac{6}{7} =$$

21

$$\frac{10}{9} + \frac{8}{9} =$$

How would you describe to someone who had never done these how to do them? In what way are questions 13-21 different from the others?

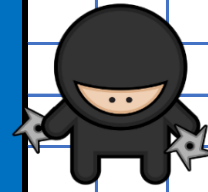
ANSWERS 8A

To Add Fractions with
the Same Denominators



watch examples

$$\frac{12}{9} + \frac{4}{9} =$$



1

$$\frac{1}{5}$$

2

$$\frac{3}{6} \text{ or } \frac{1}{2}$$

3

$$\frac{7}{8}$$

4

$$\frac{5}{6}$$

5

$$\frac{7}{9}$$

6

$$\frac{6}{11}$$

7

$$\frac{4}{5}$$

8

$$\frac{8}{10} \text{ or } \frac{4}{5}$$

9

$$\frac{11}{13}$$

10

$$\frac{5}{7}$$

11

$$\frac{17}{25}$$

12

$$\frac{7}{11}$$

13

$$\frac{7}{7} \text{ or } 1$$

14

$$\frac{7}{5} \text{ or } 1\frac{2}{5}$$

15

$$\frac{14}{10} \text{ or } 1\frac{4}{10}$$

16

$$\frac{5}{3} \text{ or } 1\frac{2}{3}$$

17

$$\frac{13}{10} \text{ or } 1\frac{3}{10}$$

18

$$\frac{6}{4} \text{ or } 1\frac{2}{4}$$

19

$$\frac{15}{12} \text{ or } 1\frac{3}{12}$$

20

$$\frac{11}{7} \text{ or } 1\frac{4}{7}$$

21

$$\frac{18}{9} \text{ or } 2$$

If the improper fraction divides to make a whole number answer with no remainder e.g Q21, then you are supposed to give the whole answer and not the improper fraction. If there is a remainder, you can leave it as either an improper fraction or a mixed number.

ARITHMETIC NINJA 8B

To Add & Subtract Fractions with the Same Denominators



watch examples

$$\frac{4}{7} + \frac{20}{7} =$$



1

$$\frac{1}{9} + \frac{4}{9} =$$

2

$$\frac{2}{7} + \frac{3}{7} =$$

3

$$\frac{5}{8} - \frac{1}{8} =$$

4

$$\frac{3}{10} + \frac{4}{10} =$$

5

$$\frac{6}{7} - \frac{1}{7} =$$

6

$$\frac{2}{5} + \frac{2}{5} =$$

7

$$\frac{6}{11} - \frac{2}{11} =$$

8

$$\frac{2}{9} + \frac{5}{9} =$$

9

$$\frac{1}{4} + \frac{3}{4} =$$

10

$$\frac{4}{5} - \frac{1}{5} =$$

11

$$\frac{4}{12} + \frac{7}{12} =$$

12

$$\frac{7}{9} - \frac{2}{9} =$$

13

$$\frac{11}{7} - \frac{3}{7} =$$

14

$$\frac{5}{6} + \frac{4}{6} =$$

15

$$\frac{1}{3} + \frac{4}{3} =$$

16

$$\frac{10}{15} + \frac{7}{15} =$$

17

$$\frac{7}{2} - \frac{1}{2} =$$

18

$$\frac{99}{100} + \frac{9}{100} =$$

19

$$\frac{8}{3} + \frac{5}{3} =$$

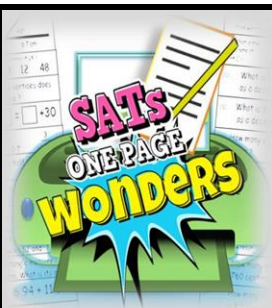
20

$$\frac{13}{7} - \frac{1}{7} =$$

21

$$\frac{1}{4} + \frac{10}{4} =$$

How would you describe to someone who had never done these how to do them? In what way are questions 13-21 different?



ANSWERS 8B

To Add & Subtract Fractions with the Same Denominators



watch examples

$$\frac{4}{7} + \frac{20}{7} =$$



1

$$\frac{5}{9}$$

2

$$\frac{5}{7}$$

3

$$\frac{4}{8} \text{ or } \frac{1}{2}$$

4

$$\frac{7}{10}$$

5

$$\frac{5}{7}$$

6

$$\frac{4}{5}$$

7

$$\frac{4}{11}$$

8

$$\frac{7}{9}$$

9

$$\frac{4}{4} \text{ or } 1$$

10

$$\frac{3}{5}$$

11

$$\frac{11}{12}$$

12

$$\frac{5}{9}$$

13

$$\frac{8}{7} \text{ or } 1 \frac{1}{7}$$

14

$$\frac{9}{6} \text{ or } 1 \frac{3}{6}$$

15

$$\frac{5}{3} \text{ or } 1 \frac{2}{3}$$

16

$$\frac{17}{15} \text{ or } 1 \frac{2}{15}$$

17

$$\frac{6}{2} \text{ or } 3$$

18

$$\frac{108}{100} \text{ or } 1 \frac{8}{100}$$

19

$$\frac{13}{3} \text{ or } 4 \frac{1}{3}$$

20

$$\frac{12}{7} \text{ or } 1 \frac{5}{7}$$

21

$$\frac{11}{4} \text{ or } 2 \frac{3}{4}$$

If the improper fraction divides to make a whole number answer with no remainder e.g Q21, then you are supposed to give the whole answer and not the improper fraction. If there is a remainder, you can leave it as either an improper fraction or a mixed number.

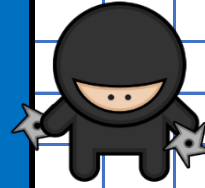
ARITHMETIC NINJA 8C

To Add & Subtract Fractions with Different Denominators (change 1 Denominator)



watch examples

$$\frac{5}{14} - \frac{1}{7} =$$



1

$$\frac{1}{8} + \frac{1}{4} =$$

2

$$\frac{1}{3} + \frac{1}{6} =$$

3

$$\frac{1}{2} - \frac{1}{10} =$$

4

$$\frac{3}{5} + \frac{1}{10} =$$

5

$$\frac{4}{6} - \frac{1}{3} =$$

6

$$\frac{3}{5} + \frac{3}{20} =$$

7

$$\frac{2}{3} - \frac{1}{12} =$$

8

$$\frac{1}{4} + \frac{5}{12} =$$

9

$$\frac{2}{15} + \frac{2}{5} =$$

10

$$\frac{13}{20} - \frac{1}{4} =$$

11

$$\frac{2}{7} + \frac{3}{14} =$$

12

$$\frac{15}{18} - \frac{2}{6} =$$

13

$$\frac{20}{27} - \frac{2}{9} =$$

14

$$\frac{30}{70} + \frac{4}{7} =$$

15

$$\frac{2}{36} + \frac{5}{6} =$$

16

$$\frac{12}{45} + \frac{6}{9} =$$

17

$$\frac{80}{100} - \frac{11}{20} =$$

18

$$\frac{10}{24} + \frac{7}{8} =$$

19

$$\frac{33}{44} + \frac{9}{11} =$$

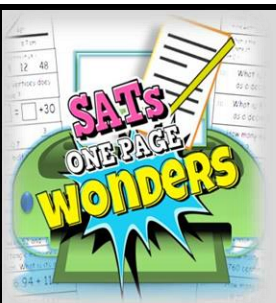
20

$$\frac{50}{60} - \frac{3}{12} =$$

21

$$\frac{40}{54} + \frac{7}{9} =$$

How would you describe to someone who had never done these how to do them?



ANSWERS 8C

To Add & Subtract Fractions with Different Denominators (change 1 Denominator)



watch examples

$$\frac{5}{14} - \frac{1}{7} =$$



1

$$\frac{3}{8}$$

2

$$\frac{3}{6} \text{ or } \frac{1}{2}$$

3

$$\frac{4}{10} \text{ or } \frac{2}{5}$$

4

$$\frac{7}{10}$$

5

$$\frac{1}{3}$$

6

$$\frac{15}{20} \text{ or } \frac{3}{4}$$

7

$$\frac{7}{12}$$

8

$$\frac{8}{12} \text{ or } \frac{2}{3}$$

9

$$\frac{8}{15}$$

10

$$\frac{8}{20} \text{ or } \frac{2}{5}$$

11

$$\frac{7}{14} \text{ or } \frac{1}{2}$$

12

$$\frac{9}{18} \text{ or } \frac{1}{2}$$

13

$$\frac{14}{27}$$

14

$$\frac{70}{70} \text{ or } 1$$

15

$$\frac{32}{36} \text{ or } \frac{8}{9}$$

16

$$\frac{42}{45} \text{ or } \frac{14}{15}$$

17

$$\frac{25}{100} \text{ or } \frac{1}{4}$$

18

$$\frac{31}{24}$$

19

$$\frac{69}{44} \text{ or } 1 \frac{25}{44}$$

20

$$\frac{35}{60} \text{ or } \frac{7}{12}$$

21

$$\frac{82}{54} \text{ or } 1 \frac{28}{54}$$

How many did you get correct?

ARITHMETIC NINJA 3D

To Add & Subtract Fractions with Different Denominators (change BOTH Denominators)



watch examples



$$\frac{1}{3} - \frac{1}{5} =$$



1

$$\frac{1}{4} + \frac{1}{6} =$$

2

$$\frac{1}{5} + \frac{2}{7} =$$

3

$$\frac{1}{5} - \frac{1}{12} =$$

4

$$\frac{2}{5} + \frac{4}{7} =$$

5

$$\frac{2}{5} - \frac{1}{3} =$$

6

$$\frac{1}{4} + \frac{6}{7} =$$

7

$$\frac{2}{3} - \frac{1}{8} =$$

8

$$\frac{4}{11} + \frac{1}{3} =$$

9

$$\frac{3}{7} + \frac{2}{8} =$$

10

$$\frac{5}{6} - \frac{3}{5} =$$

11

$$\frac{2}{6} + \frac{3}{7} =$$

12

$$\frac{3}{4} - \frac{1}{9} =$$

13

$$\frac{10}{7} - \frac{2}{3} =$$

14

$$\frac{8}{10} + \frac{8}{9} =$$

15

$$\frac{10}{22} + \frac{3}{4} =$$

16

$$\frac{3}{20} + \frac{6}{30} =$$

17

$$\frac{13}{15} - \frac{1}{4} =$$

18

$$\frac{8}{9} + \frac{2}{3} =$$

19

$$\frac{11}{7} + \frac{11}{5} =$$

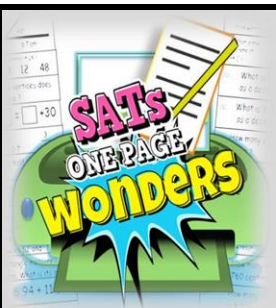
20

$$\frac{70}{100} - \frac{7}{20} =$$

21

$$\frac{17}{18} + \frac{3}{5} =$$

How would you describe to someone who had never done these how to do them?



ANSWERS 8D

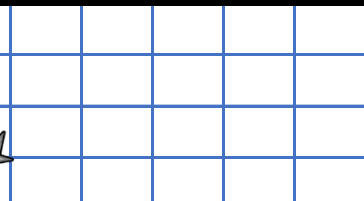
To Add & Subtract Fractions with Different Denominators (change BOTH Denominators)



watch examples



$$\frac{1}{3} - \frac{1}{5} =$$



1	$\frac{10}{24}$ or $\frac{5}{12}$	2	$\frac{17}{35}$	3	$\frac{7}{60}$
4	$\frac{34}{35}$	5	$\frac{1}{15}$	6	$\frac{31}{28}$ or $1 \frac{3}{28}$
7	$\frac{13}{24}$	8	$\frac{23}{33}$	9	$\frac{38}{56}$ or $\frac{19}{28}$
10	$\frac{7}{30}$	11	$\frac{32}{42}$ or $\frac{16}{21}$	12	$\frac{23}{36}$
13	$\frac{16}{21}$	14	$\frac{152}{90}$ or $\frac{76}{45}$	15	$\frac{106}{88}$ or $\frac{53}{44}$
16	$\frac{21}{60}$ or $\frac{7}{20}$	17	$\frac{37}{60}$ or $1 \frac{23}{60}$	18	$\frac{14}{9}$ or $1 \frac{5}{9}$
19	$\frac{132}{35}$ or $3 \frac{27}{35}$	20	$\frac{35}{100}$ or $\frac{7}{20}$	21	$\frac{139}{90}$ or $1 \frac{49}{90}$

How many did you get correct?

ARITHMETIC NINJA 8E

To Add Three Fractions with Different Denominators



watch examples

$$\frac{1}{8} + \frac{1}{4} + \frac{1}{2} =$$



1

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

2

$$\frac{1}{8} + \frac{1}{2} + \frac{1}{4} =$$

3

$$\frac{1}{10} + \frac{1}{5} + \frac{1}{2} =$$

4

$$\frac{1}{25} + \frac{1}{5} + \frac{1}{50} =$$

5

$$\frac{1}{4} + \frac{1}{5} + \frac{1}{20} =$$

6

$$\frac{1}{8} + \frac{1}{16} + \frac{1}{4} =$$

7

$$\frac{1}{12} + \frac{1}{3} + \frac{1}{4} =$$

8

$$\frac{1}{10} + \frac{1}{20} + \frac{1}{5} =$$

9

$$\frac{1}{5} + \frac{1}{30} + \frac{1}{3} =$$

10

$$\frac{1}{60} + \frac{1}{12} + \frac{1}{3} =$$

11

$$\frac{1}{8} + \frac{1}{4} + \frac{1}{24} =$$

12

$$\frac{1}{50} + \frac{1}{25} + \frac{1}{10} =$$

13

$$\frac{1}{3} + \frac{1}{21} + \frac{1}{7} =$$

14

$$\frac{1}{32} + \frac{1}{8} + \frac{1}{4} =$$

15

$$\frac{1}{6} + \frac{1}{30} + \frac{1}{5} =$$

16

$$\frac{1}{12} + \frac{1}{15} + \frac{1}{60} =$$

17

$$\frac{1}{22} + \frac{1}{11} + \frac{1}{2} =$$

18

$$\frac{1}{75} + \frac{1}{25} + \frac{1}{3} =$$

19

$$\frac{4}{6} + \frac{1}{3} + \frac{1}{2} =$$

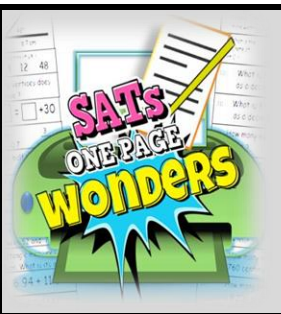
20

$$\frac{1}{8} + \frac{3}{4} + \frac{1}{2} =$$

21

$$\frac{4}{12} + \frac{1}{3} + \frac{1}{4} =$$

How would you explain a method to do these someone who had not done any before?



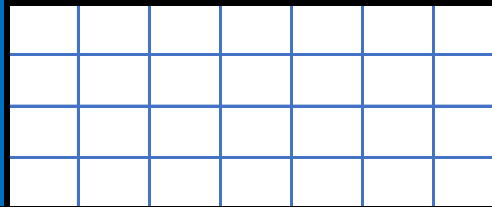
ANSWERS 8E

To Add Three Fractions with Different Denominators



watch examples

$$\frac{1}{8} + \frac{1}{4} + \frac{1}{2} =$$



1	$\frac{6}{6}$ or $\frac{12}{12}$	2	$\frac{7}{8}$ or $\frac{14}{16}$	3	$\frac{16}{20}$ or $\frac{4}{5}$ or $\frac{32}{40}$
----------	----------------------------------	----------	----------------------------------	----------	---

4	$\frac{13}{50}$ or $\frac{26}{100}$	5	$\frac{10}{20}$ or $\frac{20}{40}$ or $\frac{1}{2}$	6	$\frac{7}{16}$ or $\frac{14}{32}$
----------	-------------------------------------	----------	---	----------	-----------------------------------

7	$\frac{8}{12}$ or $\frac{16}{24}$ or $\frac{2}{3}$	8	$\frac{7}{20}$ or $\frac{14}{40}$	9	$\frac{17}{30}$ or $\frac{34}{60}$
----------	--	----------	-----------------------------------	----------	------------------------------------

10	$\frac{26}{60}$ or $\frac{13}{30}$	11	$\frac{10}{24}$ or $\frac{5}{12}$	12	$\frac{8}{50}$ or $\frac{4}{25}$
-----------	------------------------------------	-----------	-----------------------------------	-----------	----------------------------------

13	$\frac{11}{21}$	14	$\frac{13}{32}$	15	$\frac{12}{30}$ or $\frac{24}{60}$ or $\frac{2}{5}$
-----------	-----------------	-----------	-----------------	-----------	---

16	$\frac{10}{60}$ or $\frac{1}{6}$	17	$\frac{14}{22}$ or $\frac{7}{11}$	18	$\frac{29}{75}$
-----------	----------------------------------	-----------	-----------------------------------	-----------	-----------------

19	$\frac{9}{6}$ or $\frac{18}{12}$ or $\frac{27}{18}$	20	$\frac{11}{8}$ or $\frac{22}{16}$ or $\frac{44}{32}$	21	$\frac{11}{12}$ or $\frac{22}{24}$ or $\frac{33}{36}$
-----------	---	-----------	--	-----------	---

How would you explain a method to do these someone who had not done any before?

ARITHMETIC NINJA 8F



To Add Mixed Number Fractions
(where carrying over a whole 1 is required)



watch examples

$$4 \frac{7}{8} + 4 \frac{3}{4} =$$



1 $3 \frac{1}{3} + 1 \frac{1}{3} =$

2 $5 \frac{1}{9} + 1 \frac{5}{9} =$

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

4 $5 \frac{3}{4} + 4 \frac{1}{4} =$

5 $2 \frac{5}{6} + 4 \frac{5}{6} =$

6 $4 \frac{7}{9} + 3 \frac{5}{9} =$

7 $2 \frac{1}{3} + 2 \frac{1}{6} =$

8 $3 \frac{1}{2} + 1 \frac{1}{4} =$

9 $3 \frac{1}{4} + 1 \frac{3}{8} =$

10 $1 \frac{5}{6} + 2 \frac{1}{3} =$

11 $4 \frac{3}{4} + 2 \frac{1}{2} =$

12 $2 \frac{5}{6} + 1 \frac{1}{2} =$

13 $2 \frac{1}{3} + 4 \frac{7}{9} =$

14 $1 \frac{7}{8} + 2 \frac{1}{4} =$

15 $4 \frac{1}{2} + 1 \frac{5}{8} =$

16 $3 \frac{1}{2} + 4 \frac{3}{4} =$

17 $2 \frac{1}{2} + 4 \frac{5}{6} =$

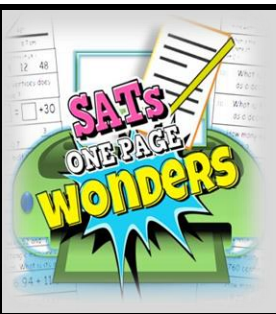
18 $4 \frac{7}{9} + 4 \frac{2}{3} =$

19 $3 \frac{3}{4} + 4 \frac{5}{8} =$

20 $3 \frac{2}{3} + 4 \frac{8}{9} =$

21 $4 \frac{7}{8} + 4 \frac{3}{4} =$

What is special about the answer to Q4. Why are Q5 + Q6 slightly harder than Q1,2,3? What must you do from Q7 onwards?



ANSWERS 8F

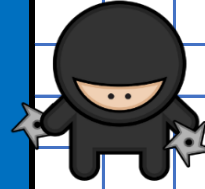
To Add Mixed Number Fractions

(where carrying over a whole 1 is required)



watch examples

$$4 \frac{7}{8} + 4 \frac{3}{4} =$$



1

$4 \frac{2}{3}$

2

$6 \frac{6}{9}$ or $6 \frac{2}{3}$

3

$4 \frac{2}{6}$ or $4 \frac{1}{3}$

4

$9 \frac{4}{4}$ is 10

5

$6 \frac{10}{6}$ is $7 \frac{4}{6}$ or $\frac{2}{3}$

6

$7 \frac{12}{9}$ is $8 \frac{3}{9}$ or $\frac{1}{3}$

7

$4 \frac{3}{6}$ or $4 \frac{1}{2}$

8

$4 \frac{3}{4}$

9

$4 \frac{5}{8}$

10

$3 \frac{7}{6}$ is $4 \frac{1}{6}$

11

$6 \frac{5}{4}$ is $7 \frac{1}{4}$

12

$3 \frac{8}{6}$ is $4 \frac{2}{6}$ or $\frac{1}{3}$

13

$6 \frac{10}{9}$ is $7 \frac{1}{9}$

14

$3 \frac{9}{8}$ is $4 \frac{1}{8}$

15

$5 \frac{9}{8}$ is $6 \frac{1}{8}$

16

$7 \frac{5}{4}$ is $8 \frac{1}{4}$

17

$6 \frac{8}{6}$ is $7 \frac{2}{6}$ or $\frac{1}{3}$

18

$8 \frac{13}{9}$ is $9 \frac{4}{9}$

19

$7 \frac{11}{8}$ is $8 \frac{3}{8}$

20

$7 \frac{14}{9}$ is $8 \frac{5}{9}$

21

$8 \frac{18}{8}$ is $9 \frac{5}{8}$

IMPORTANT! The answers in yellow may be a correct part of your working, but they would be unacceptable as a final answer because in a mixed number, the fraction part is not allowed to be an improper fraction.

ARITHMETIC NINJA 8G

To Subtract Mixed
Number Fractions (where borrowing
from a Whole 1 is required)



watch examples

$$5 \frac{1}{3} - 4 \frac{5}{6} =$$



1 $6 \frac{3}{5} - 1 \frac{1}{5} =$

2 $8 \frac{2}{3} - 1 \frac{1}{3} =$

3 $5 \frac{4}{7} - 1 \frac{4}{7} =$

4 $6 \frac{4}{9} - 2 \frac{8}{9} =$

5 $5 \frac{1}{7} - 3 \frac{5}{7} =$

6 $5 \frac{3}{5} - 4 \frac{4}{5} =$

7 $8 \frac{1}{8} - 2 \frac{7}{8} =$

8 $6 \frac{3}{8} - 2 \frac{5}{8} =$

9 $5 \frac{1}{3} - 3 \frac{5}{9} =$

10 $5 \frac{1}{2} - 2 \frac{7}{8} =$

11 $7 \frac{1}{4} - 4 \frac{7}{8} =$

12 $4 \frac{1}{4} - 3 \frac{3}{8} =$

13 $6 \frac{1}{8} - 4 \frac{1}{4} =$

14 $4 \frac{3}{8} - 1 \frac{1}{2} =$

15 $7 \frac{4}{9} - 5 \frac{2}{3} =$

16 $8 \frac{2}{3} - 2 \frac{5}{6} =$

17 $6 \frac{1}{2} - 4 \frac{5}{8} =$

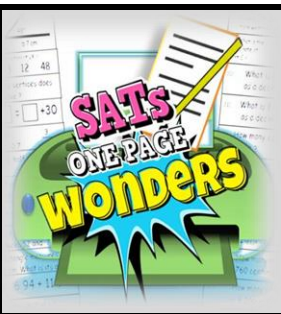
18 $6 \frac{2}{3} - 1 \frac{7}{9} =$

19 $9 \frac{3}{4} - 4 \frac{7}{8} =$

20 $8 \frac{1}{2} - 4 \frac{5}{6} =$

21 $5 \frac{1}{3} - 4 \frac{5}{6} =$

Explain why the top row of questions is easier than all the others? Watch the video tutorial to see how a column method can be used. You simply borrow a whole one if the top fraction is smaller! See the video for more!



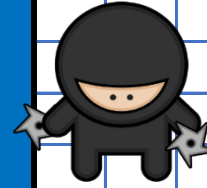
ANSWERS 8G

To Subtract Mixed
Number Fractions (where borrowing
from a Whole 1 is required)



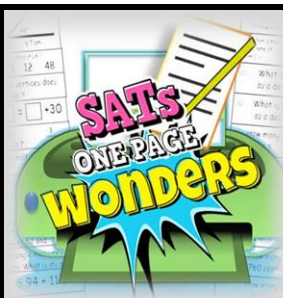
watch examples

$$5 \frac{1}{3} - 4 \frac{5}{6} =$$



1	$5 \frac{2}{5}$	2	$7 \frac{1}{3}$	3	$4 \frac{0}{7}$ or 4
4	$\frac{32}{9}$ or $3 \frac{5}{9}$	5	$\frac{10}{7}$ or $1 \frac{3}{7}$	6	$0 \frac{4}{5}$ or $\frac{4}{5}$
7	$\frac{42}{8}$ or $5 \frac{2}{8}$ or $\frac{1}{4}$	8	$\frac{30}{8}$ or $3 \frac{6}{8}$ or $\frac{3}{4}$	9	$\frac{16}{9}$ or $1 \frac{7}{9}$
10	$\frac{21}{8}$ or $2 \frac{5}{8}$	11	$\frac{19}{8}$ or $2 \frac{3}{8}$	12	$0 \frac{7}{8}$ or $\frac{7}{8}$
13	$\frac{15}{8}$ or $1 \frac{7}{8}$	14	$\frac{23}{8}$ or $2 \frac{7}{8}$	15	$\frac{16}{9}$ or $1 \frac{7}{9}$
16	$\frac{35}{6}$ or $5 \frac{5}{6}$	17	$\frac{15}{8}$ or $1 \frac{7}{8}$	18	$\frac{44}{9}$ or $4 \frac{8}{9}$
19	$\frac{39}{8}$ or $4 \frac{7}{8}$	20	$\frac{22}{6}$ or $3 \frac{4}{6}$ or $\frac{2}{3}$	21	$\frac{3}{6}$ or $\frac{1}{2}$

Answers are acceptable in either improper fraction or mixed number format!



To Multiply a Fraction by Another Fraction



watch examples

$$\frac{1}{7} \times \frac{2}{5} =$$



1

$$\frac{3}{7} \times \frac{1}{8} =$$

2

$$\frac{4}{5} \times \frac{1}{3} =$$

3

$$\frac{1}{9} \times \frac{4}{7} =$$

4

$$\frac{2}{3} \times \frac{4}{5} =$$

5

$$\frac{7}{8} \times \frac{1}{9} =$$

6

$$\frac{5}{9} \times \frac{3}{4} =$$

7

$$\frac{1}{10} \times \frac{7}{8} =$$

8

$$\frac{2}{4} \times \frac{6}{8} =$$

9

$$\frac{2}{6} \times \frac{2}{8} =$$

10

$$\frac{2}{3} \times \frac{4}{10} =$$

11

$$\frac{2}{3} \times \frac{3}{7} =$$

12

$$\frac{3}{5} \times \frac{6}{9} =$$

13

$$\frac{15}{30} \times \frac{3}{5} =$$

14

$$\frac{10}{20} \times \frac{4}{7} =$$

15

$$\frac{12}{40} \times \frac{2}{3} =$$

16

$$\frac{8}{3} \times \frac{4}{5} =$$

17

$$\frac{11}{7} \times \frac{5}{8} =$$

18

$$\frac{2}{9} \times \frac{10}{6} =$$

19

$$\frac{30}{4} \times \frac{2}{3} =$$

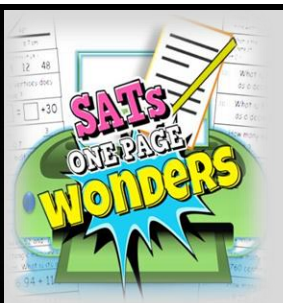
20

$$\frac{11}{4} \times \frac{11}{6} =$$

21

$$\frac{100}{5} \times \frac{4}{70} =$$

How would you describe to someone who had never done these how to do them?



ANSWERS 9A

To Multiply a Fraction by Another Fraction



watch examples

$$\frac{1}{7} \times \frac{2}{5} =$$



1

$$\frac{3}{56}$$

2

$$\frac{4}{15}$$

3

$$\frac{4}{63}$$

4

$$\frac{8}{15}$$

5

$$\frac{7}{72}$$

6

$$\frac{15}{36} \text{ or } \frac{5}{12}$$

7

$$\frac{7}{80}$$

8

$$\frac{12}{32} \text{ or } \frac{3}{8} =$$

9

$$\frac{4}{48} \text{ or } \frac{1}{12}$$

10

$$\frac{8}{30} \text{ or } \frac{4}{15}$$

11

$$\frac{6}{21} \text{ or } \frac{2}{7}$$

12

$$\frac{18}{45} \text{ or } \frac{2}{5}$$

13

$$\frac{45}{150} \text{ or } \frac{9}{30}$$

14

$$\frac{40}{140} \text{ or } \frac{2}{7} =$$

15

$$\frac{24}{120} \text{ or } \frac{1}{5}$$

16

$$\frac{32}{15} \text{ or } 2\frac{2}{15}$$

17

$$\frac{55}{56}$$

18

$$\frac{20}{54} \text{ or } \frac{10}{27}$$

19

$$\frac{60}{12} \text{ or } 5 =$$

20

$$\frac{121}{24} \text{ or } 5\frac{1}{24}$$

21

$$\frac{400}{350} \text{ or } \frac{8}{7}$$

Q21 Could also be 1 whole and seven eighths!

To Divide a Fraction by A Whole Number



watch examples

$$\frac{1}{8} \div 2 =$$



1

$$\frac{1}{7} \div 3 =$$

2

$$\frac{1}{6} \div 5 =$$

3

$$\frac{1}{8} \div 4 =$$

4

$$\frac{3}{5} \div 6 =$$

5

$$\frac{2}{3} \div 2 =$$

6

$$\frac{4}{5} \div 3 =$$

7

$$\frac{6}{11} \div 2 =$$

8

$$\frac{3}{9} \div 9 =$$

9

$$\frac{5}{6} \div 7 =$$

10

$$\frac{2}{9} \div 3 =$$

11

$$\frac{7}{9} \div 8 =$$

12

$$\frac{3}{8} \div 5 =$$

13

$$\frac{6}{7} \div 10 =$$

14

$$\frac{2}{3} \div 20 =$$

15

$$\frac{3}{5} \div 30 =$$

16

$$\frac{11}{7} \div 2 =$$

17

$$\frac{10}{4} \div 3 =$$

18

$$\frac{13}{4} \div 6 =$$

19

$$\frac{5}{4} \div 12 =$$

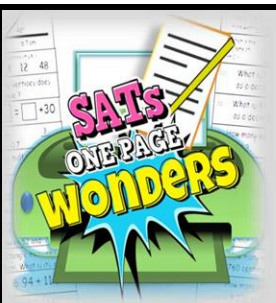
20

$$\frac{10}{7} \div 11 =$$

21

$$\frac{100}{11} \div 12 =$$

How would you describe to someone who had never done these how to do them?



ANSWERS 9B

To Divide a Fraction
by A Whole Number



watch examples

$$\frac{1}{8} \div 2 =$$



1

$$\frac{1}{21}$$

2

$$\frac{1}{30}$$

3

$$\frac{1}{32}$$

4

$$\frac{3}{30} \text{ or } \frac{1}{10}$$

5

$$\frac{2}{6} \text{ or } \frac{1}{3}$$

6

$$\frac{4}{15}$$

7

$$\frac{6}{22} \text{ or } \frac{3}{11}$$

8

$$\frac{3}{81} \text{ or } \frac{1}{27}$$

9

$$\frac{5}{42}$$

10

$$\frac{2}{27}$$

11

$$\frac{7}{72}$$

12

$$\frac{3}{40}$$

13

$$\frac{6}{70}$$

14

$$\frac{2}{60} \text{ or } \frac{1}{30}$$

15

$$\frac{3}{150} \text{ or } \frac{1}{50}$$

16

$$\frac{11}{14}$$

17

$$\frac{10}{12} \text{ or } \frac{5}{6}$$

18

$$\frac{13}{24}$$

19

$$\frac{5}{48}$$

20

$$\frac{10}{77}$$

21

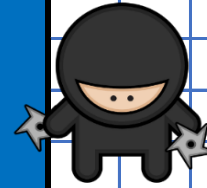
$$\frac{100}{132} \text{ or } \frac{25}{33}$$

How would you describe to someone who had never done these how to do them?

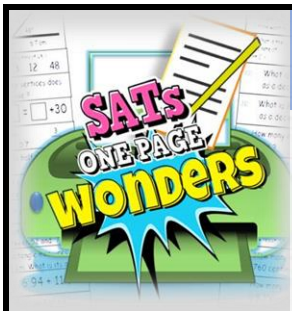
To Multiply a Fraction by A Whole Number



watch examples

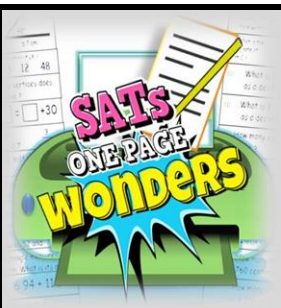


$$\frac{3}{20} \text{ of } 110 =$$



1	$\frac{1}{4} \times 160 =$	2	$\frac{1}{9} \times 128 =$	3	$\frac{2}{5} \times 420 =$
4	$\frac{2}{5} \times 160 =$	5	$\frac{5}{8} \text{ of } 56 =$	6	$\frac{6}{40} \times 90 =$
7	$\frac{5}{7} \text{ of } 110 =$	8	$\frac{7}{10} \text{ of } 80 =$	9	$\frac{2}{12} \text{ of } 250 =$
10	$\frac{3}{8} \times 330 =$	11	$\frac{3}{7} \text{ of } 190 =$	12	$\frac{5}{9} \times 130 =$
13	$\frac{3}{6} \text{ of } 150 =$	14	$\frac{8}{10} \times 530 =$	15	$\frac{1}{20} \times 280 =$
16	$\frac{2}{9} \times 340 =$	17	$\frac{4}{15} \text{ of } 150 =$	18	$\frac{2}{3} \text{ of } 441 =$
19	$\frac{3}{4} \times 333 =$	20	$\frac{2}{11} \text{ of } 444 =$	21	$\frac{6}{7} \text{ of } 120 =$

How would you describe to someone who had never done these how to do them?



ANSWERS 9C

To Multiply a Fraction by A Whole Number



watch examples

$$\frac{3}{20} \text{ of } 110 =$$



1	40	2	$\frac{128}{9}$ or 14 $\frac{2}{9}$	3	$\frac{840}{5} = 168$
4	$\frac{320}{5} = 64$	5	$\frac{280}{8} = 35$	6	$\frac{540}{40}$ or 13 $\frac{20}{40}$
7	$\frac{550}{7}$ or 78 $\frac{4}{7}$	8	$\frac{560}{10} = 56$	9	$\frac{500}{12}$ or 41 $\frac{8}{12}$
10	$\frac{990}{8}$ or 123 $\frac{6}{8}$	11	$\frac{570}{7}$ or 81 $\frac{3}{7}$	12	$\frac{650}{9}$ or 72 $\frac{2}{9}$
13	$\frac{450}{6} = 75$	14	$\frac{4240}{10} = 424$	15	$\frac{280}{20} = 14$
16	$\frac{680}{9}$ or 75 $\frac{5}{9}$	17	$\frac{600}{15} = 40$	18	$\frac{882}{3} = 294$
19	$\frac{999}{4}$ or 249 $\frac{3}{4}$	20	$\frac{888}{11}$ or 80 $\frac{8}{11}$	21	$\frac{120}{7}$ or 17 $\frac{1}{7}$

NOTE: As the improper fractions in grey work out as whole number with NO remainder, previous SATs markschemes have required students to work it out as the whole answer. If there is a remainder you are allowed to leave it as an improper fraction. If there is no remainder, you have to work it out as a whole number.

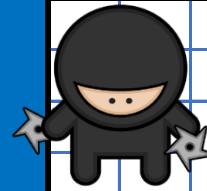
ARITHMETIC NINJA 9D

To Multiply a Mixed Number by a Whole Number



watch examples

$$5 \frac{7}{10} \times 50 =$$



1

$$1 \frac{1}{2} \times 50 =$$

2

$$1 \frac{1}{2} \times 26 =$$

3

$$1 \frac{1}{2} \times 84 =$$

4

$$1 \frac{1}{2} \text{ of } 114 =$$

5

$$1 \frac{1}{2} \times 74 =$$

6

$$1 \frac{1}{2} \times 222 =$$

7

$$2 \frac{1}{2} \times 46 =$$

8

$$2 \frac{1}{2} \text{ of } 130 =$$

9

$$2 \frac{1}{2} \times 424 =$$

10

$$2 \frac{1}{2} \times 72 =$$

11

$$2 \frac{1}{2} \times 900 =$$

12

$$2 \frac{1}{2} \times 118 =$$

13

$$2 \frac{1}{4} \times 48 =$$

14

$$3 \frac{1}{2} \times 52 =$$

15

$$4 \frac{1}{3} \times 90 =$$

16

$$5 \frac{3}{4} \text{ of } 80 =$$

17

$$2 \frac{2}{3} \times 150 =$$

18

$$5 \frac{2}{3} \text{ of } 60 =$$

19

$$3 \frac{2}{5} \times 40 =$$

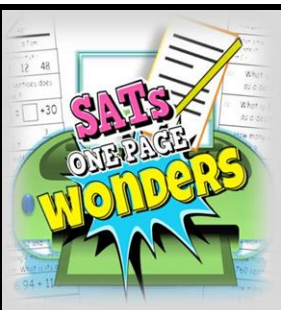
20

$$4 \frac{7}{8} \times 32 =$$

21

$$2 \frac{5}{9} \times 99 =$$

Have you used the same method for all of the questions even though the numbers are different?



ANSWERS 9D

To Multiply a Mixed Number by a Whole Number



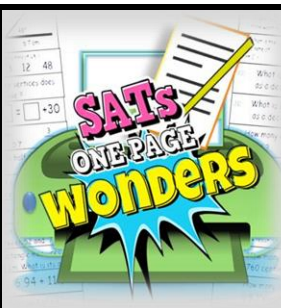
watch examples

$$5 \frac{7}{10} \times 50 =$$



1	75	2	39	3	126
4	171	5	111	6	333
7	115	8	325	9	1,060
10	180	11	2,250	12	295
13	108	14	182	15	390
16	460	17	400	18	340
19	136	20	156	21	253

How many did you get correct?



ARITHMETIC NINJA 10A

To Use the Correct Order of Operations (B.I.D.M.A.S)
(no indices involved here)



watch examples

$$(14 + 4) \times (12 \div 6) =$$



1 $6 + 4 \times 15 =$

2 $(6 + 4) \times 15 =$

3 $7 + (12 \div 4) =$

4 $24 - 3 \times 8 =$

5 $15 + 0 \times 13 =$

6 $12 \div (7 - 3) =$

7 $(11 + 19) \div 15 =$

8 $15 \times (9 - 7) =$

9 $(17 - 10) \div 2 =$

10 $(24 - 3) \times 8 =$

11 $5 \times 3 + 4 =$

12 $7 + 6 \times 3 =$

13 $11 + 5 \times 20 =$

14 $100 + 21 \div 3 =$

15 $3 + 16 \times 2 =$

16 $100 - 3 \times 21 =$

17 $70 + 8 \div 2 =$

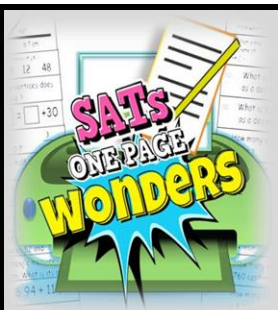
18 $(70 + 2) \div 8 =$

19 $22 - 6 \times 3 =$

20 $6 + 12 \div 4 - 2 =$

21 $(3 + 9) \div (2 + 1) =$

What advice would you give to people trying to use the correct order of operations? What is there are two sets of brackets, like in Q21?

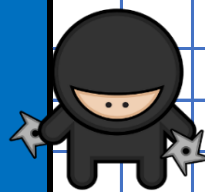


ANSWERS 10A

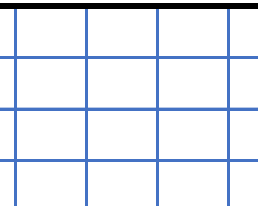
To Use the Correct Order of Operations (B.I.D.M.A.S)
(no indices involved here)



watch examples



$$(14 + 4) \times (12 \div 6) =$$



1	66	2	150	3	10
4	0	5	15	6	3
7	2	8	30	9	3.5
10	168	11	19	12	25
13	111	14	107	15	35
16	37	17	74	18	9
19	4	20	7	21	4

If you got any incorrect, check that you did the operations in the correct order!

ARITHMETIC NINJA 10B

To Use the Correct Order of Operations (B.I.D.M.A.S) (involving indices)



watch examples



$$\square + 3^2 = 78$$



1 $7^2 - 31 =$

2 $(3 + 7)^2 =$

3 $5^2 + 100 =$

4 $(11 - 3)^2 =$

5 $4^2 + 27 =$

6 $\square + 3^2 = 99$

7 $3 \times (1 + 7)^2 =$

8 $(2 + 4)^2 \times 3 =$

9 $(27 \div 3)^2 =$

10 $62 + 5^2 =$

11 $6^2 - \square = 30$

12 $70 - (2 \times 3)^2 =$

13 $7 + 5 \times (2 + 5)^2 =$

14 $17 - 4^2 =$

15 $\square + 10^2 = 218$

16 $7^2 - \square = 30$

17 $10 - 2^3 =$

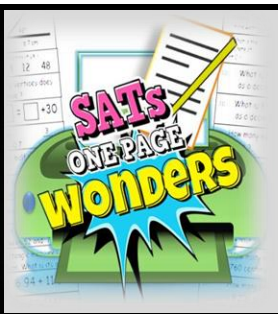
18 $(3 + 2 \times 4)^2 + 11 =$

19 $5^3 - 30 =$

20 $12^2 - \square = 30$

21 $(\square + 3)^2 = 25$

What advice would you give to people when calculating sums using BIDMAS or BODMAS?



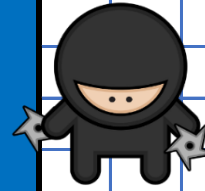
ANSWERS 10B

To Use the Correct Order of Operations (B.I.D.M.A.S) (involving indices)



watch examples

$$\square + 3^2 = 78$$



1	18	2	100	3	125
4	64	5	43	6	90
7	192	8	108	9	81
10	87	11	6	12	34
13	252	14	1	15	118
16	19	17	2	18	132
19	95	20	114	21	2

What advice would you give to people when calculating sums using BIDMAS or BODMAS?