

1st May 2013
Problem 1
Solution by Adi Cox.

Emilio Carraro
12:31 PM -
Hello.
Find two 3-digit numbers A and B such that

$$a^3 + b^3 + c^3 = B, \quad x^3 + y^3 + z^3 = A$$

$$\text{where } A = 100a + 10b + c \quad \text{and} \quad B = 100x + 10y + z$$

Where $a=2, b=4, c=4,$
 $x=1, y=3, z=6,$

A=244
B=136

```
<!DOCTYPE HTML PUBLIC " - //W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd"
">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<title>A for loop</title>
</head>
<body>
<script type="text/javascript" language="javascript">

document.write("<h3>The 3 digit base 8 numbers = 5<h3>")

u=0;
v=9

for (a = u; a <= v; a++)
{
    for (b = u; b <= v; b++)
    {
        for (c = u; c <= v; c++)
        {
            {
if( ((a*a*a + b*b*b + c*c*c)>99)&&((a*a*a + b*b*b + c*c*c)<1000))
document.write(a,b,c," = ", a*a*a + b*b*b + c*c*c,"<br />");
            }
        }
    }
}

</script>
</body>
```

005 = 125
006 = 216
007 = 343
008 = 512
009 = 729
015 = 126
016 = 217
017 = 344
018 = 513
019 = 730
025 = 133
026 = 224
027 = 351
028 = 520
029 = 737
035 = 152
036 = 243
037 = 370
038 = 539
039 = 756
044 = 128
045 = 189
046 = 280
047 = 407
048 = 576
049 = 793
050 = 125
051 = 126
052 = 133
053 = 152
054 = 189
055 = 250
056 = 341
057 = 468
058 = 637
059 = 854
060 = 216
061 = 217
062 = 224
063 = 243
064 = 280
065 = 341
066 = 432
067 = 559
068 = 728
069 = 945
070 = 343
071 = 344
072 = 351
073 = 370
074 = 407
075 = 468
076 = 559
077 = 686
078 = 855
080 = 512
081 = 513

082 = 520
083 = 539
084 = 576
085 = 637
086 = 728
087 = 855
090 = 729
091 = 730
092 = 737
093 = 756
094 = 793
095 = 854
096 = 945
105 = 126
106 = 217
107 = 344
108 = 513
109 = 730
115 = 127
116 = 218
117 = 345
118 = 514
119 = 731
125 = 134
126 = 225
127 = 352
128 = 521
129 = 738
135 = 153
136 = 244
137 = 371
138 = 540
139 = 757
144 = 129
145 = 190
146 = 281
147 = 408
148 = 577
149 = 794
150 = 126
151 = 127
152 = 134
153 = 153
154 = 190
155 = 251
156 = 342
157 = 469
158 = 638
159 = 855
160 = 217
161 = 218
162 = 225
163 = 244
164 = 281
165 = 342
166 = 433
167 = 560
168 = 729
169 = 946
170 = 344

171 = 345
172 = 352
173 = 371
174 = 408
175 = 469
176 = 560
177 = 687
178 = 856
180 = 513
181 = 514
182 = 521
183 = 540
184 = 577
185 = 638
186 = 729
187 = 856
190 = 730
191 = 731
192 = 738
193 = 757
194 = 794
195 = 855
196 = 946
205 = 133
206 = 224
207 = 351
208 = 520
209 = 737
215 = 134
216 = 225
217 = 352
218 = 521
219 = 738
225 = 141
226 = 232
227 = 359
228 = 528
229 = 745
235 = 160
236 = 251
237 = 378
238 = 547
239 = 764
244 = 136
245 = 197
246 = 288
247 = 415
248 = 584
249 = 801
250 = 133
251 = 134
252 = 141
253 = 160
254 = 197
255 = 258
256 = 349
257 = 476
258 = 645
259 = 862
260 = 224

261 = 225
262 = 232
263 = 251
264 = 288
265 = 349
266 = 440
267 = 567
268 = 736
269 = 953
270 = 351
271 = 352
272 = 359
273 = 378
274 = 415
275 = 476
276 = 567
277 = 694
278 = 863
280 = 520
281 = 521
282 = 528
283 = 547
284 = 584
285 = 645
286 = 736
287 = 863
290 = 737
291 = 738
292 = 745
293 = 764
294 = 801
295 = 862
296 = 953
305 = 152
306 = 243
307 = 370
308 = 539
309 = 756
315 = 153
316 = 244
317 = 371
318 = 540
319 = 757
325 = 160
326 = 251
327 = 378
328 = 547
329 = 764
334 = 118
335 = 179
336 = 270
337 = 397
338 = 566
339 = 783
343 = 118
344 = 155
345 = 216
346 = 307
347 = 434
348 = 603

349 = 820
350 = 152
351 = 153
352 = 160
353 = 179
354 = 216
355 = 277
356 = 368
357 = 495
358 = 664
359 = 881
360 = 243
361 = 244
362 = 251
363 = 270
364 = 307
365 = 368
366 = 459
367 = 586
368 = 755
369 = 972
370 = 370
371 = 371
372 = 378
373 = 397
374 = 434
375 = 495
376 = 586
377 = 713
378 = 882
380 = 539
381 = 540
382 = 547
383 = 566
384 = 603
385 = 664
386 = 755
387 = 882
390 = 756
391 = 757
392 = 764
393 = 783
394 = 820
395 = 881
396 = 972
404 = 128
405 = 189
406 = 280
407 = 407
408 = 576
409 = 793
414 = 129
415 = 190
416 = 281
417 = 408
418 = 577
419 = 794
424 = 136
425 = 197
426 = 288

427 = 415
428 = 584
429 = 801
433 = 118
434 = 155
435 = 216
436 = 307
437 = 434
438 = 603
439 = 820
440 = 128
441 = 129
442 = 136
443 = 155
444 = 192
445 = 253
446 = 344
447 = 471
448 = 640
449 = 857
450 = 189
451 = 190
452 = 197
453 = 216
454 = 253
455 = 314
456 = 405
457 = 532
458 = 701
459 = 918
460 = 280
461 = 281
462 = 288
463 = 307
464 = 344
465 = 405
466 = 496
467 = 623
468 = 792
470 = 407
471 = 408
472 = 415
473 = 434
474 = 471
475 = 532
476 = 623
477 = 750
478 = 919
480 = 576
481 = 577
482 = 584
483 = 603
484 = 640
485 = 701
486 = 792
487 = 919
490 = 793
491 = 794
492 = 801
493 = 820

494 = 857
495 = 918
500 = 125
501 = 126
502 = 133
503 = 152
504 = 189
505 = 250
506 = 341
507 = 468
508 = 637
509 = 854
510 = 126
511 = 127
512 = 134
513 = 153
514 = 190
515 = 251
516 = 342
517 = 469
518 = 638
519 = 855
520 = 133
521 = 134
522 = 141
523 = 160
524 = 197
525 = 258
526 = 349
527 = 476
528 = 645
529 = 862
530 = 152
531 = 153
532 = 160
533 = 179
534 = 216
535 = 277
536 = 368
537 = 495
538 = 664
539 = 881
540 = 189
541 = 190
542 = 197
543 = 216
544 = 253
545 = 314
546 = 405
547 = 532
548 = 701
549 = 918
550 = 250
551 = 251
552 = 258
553 = 277
554 = 314
555 = 375
556 = 466
557 = 593

558 = 762
559 = 979
560 = 341
561 = 342
562 = 349
563 = 368
564 = 405
565 = 466
566 = 557
567 = 684
568 = 853
570 = 468
571 = 469
572 = 476
573 = 495
574 = 532
575 = 593
576 = 684
577 = 811
578 = 980
580 = 637
581 = 638
582 = 645
583 = 664
584 = 701
585 = 762
586 = 853
587 = 980
590 = 854
591 = 855
592 = 862
593 = 881
594 = 918
595 = 979
600 = 216
601 = 217
602 = 224
603 = 243
604 = 280
605 = 341
606 = 432
607 = 559
608 = 728
609 = 945
610 = 217
611 = 218
612 = 225
613 = 244
614 = 281
615 = 342
616 = 433
617 = 560
618 = 729
619 = 946
620 = 224
621 = 225
622 = 232
623 = 251
624 = 288
625 = 349

626 = 440
627 = 567
628 = 736
629 = 953
630 = 243
631 = 244
632 = 251
633 = 270
634 = 307
635 = 368
636 = 459
637 = 586
638 = 755
639 = 972
640 = 280
641 = 281
642 = 288
643 = 307
644 = 344
645 = 405
646 = 496
647 = 623
648 = 792
650 = 341
651 = 342
652 = 349
653 = 368
654 = 405
655 = 466
656 = 557
657 = 684
658 = 853
660 = 432
661 = 433
662 = 440
663 = 459
664 = 496
665 = 557
666 = 648
667 = 775
668 = 944
670 = 559
671 = 560
672 = 567
673 = 586
674 = 623
675 = 684
676 = 775
677 = 902
680 = 728
681 = 729
682 = 736
683 = 755
684 = 792
685 = 853
686 = 944
690 = 945
691 = 946
692 = 953
693 = 972

700 = 343
701 = 344
702 = 351
703 = 370
704 = 407
705 = 468
706 = 559
707 = 686
708 = 855
710 = 344
711 = 345
712 = 352
713 = 371
714 = 408
715 = 469
716 = 560
717 = 687
718 = 856
720 = 351
721 = 352
722 = 359
723 = 378
724 = 415
725 = 476
726 = 567
727 = 694
728 = 863
730 = 370
731 = 371
732 = 378
733 = 397
734 = 434
735 = 495
736 = 586
737 = 713
738 = 882
740 = 407
741 = 408
742 = 415
743 = 434
744 = 471
745 = 532
746 = 623
747 = 750
748 = 919
750 = 468
751 = 469
752 = 476
753 = 495
754 = 532
755 = 593
756 = 684
757 = 811
758 = 980
760 = 559
761 = 560
762 = 567
763 = 586
764 = 623
765 = 684

766 = 775
767 = 902
770 = 686
771 = 687
772 = 694
773 = 713
774 = 750
775 = 811
776 = 902
780 = 855
781 = 856
782 = 863
783 = 882
784 = 919
785 = 980
800 = 512
801 = 513
802 = 520
803 = 539
804 = 576
805 = 637
806 = 728
807 = 855
810 = 513
811 = 514
812 = 521
813 = 540
814 = 577
815 = 638
816 = 729
817 = 856
820 = 520
821 = 521
822 = 528
823 = 547
824 = 584
825 = 645
826 = 736
827 = 863
830 = 539
831 = 540
832 = 547
833 = 566
834 = 603
835 = 664
836 = 755
837 = 882
840 = 576
841 = 577
842 = 584
843 = 603
844 = 640
845 = 701
846 = 792
847 = 919
850 = 637
851 = 638
852 = 645
853 = 664
854 = 701

855 = 762
856 = 853
857 = 980
860 = 728
861 = 729
862 = 736
863 = 755
864 = 792
865 = 853
866 = 944
870 = 855
871 = 856
872 = 863
873 = 882
874 = 919
875 = 980
900 = 729
901 = 730
902 = 737
903 = 756
904 = 793
905 = 854
906 = 945
910 = 730
911 = 731
912 = 738
913 = 757
914 = 794
915 = 855
916 = 946
920 = 737
921 = 738
922 = 745
923 = 764
924 = 801
925 = 862
926 = 953
930 = 756
931 = 757
932 = 764
933 = 783
934 = 820
935 = 881
936 = 972
940 = 793
941 = 794
942 = 801
943 = 820
944 = 857
945 = 918
950 = 854
951 = 855
952 = 862
953 = 881
954 = 918
955 = 979
960 = 945
961 = 946
962 = 953
963 = 972

We have 717 3 digit answers above.

This is the best answer I have found:

$$2^3 + 4^3 + 4^3 = 136$$

$$1^3 + 3^3 + 6^3 = 244$$

4 solutions below where $A = B$

$$1^3 + 5^3 + 3^3 = 153$$

$$1^3 + 5^3 + 3^3 = 153$$

$$3^3 + 7^3 + 0^3 = 370$$

$$3^3 + 7^3 + 0^3 = 370$$

$$3^3 + 7^3 + 1^3 = 371$$

$$3^3 + 7^3 + 1^3 = 371$$

$$4^3 + 0^3 + 7^3 = 370$$

$$4^3 + 0^3 + 7^3 = 370$$

Thomas Andrews 5:56 PM

There are four solutions where $A=B$, and exactly one solution with $A<B$, but I only solved that brute force.?

Emilio Carraro 6:03 PM

Ok +Thomas Andrews! brute force always works! ;)

What is the solution with $A<B$?