Inequalities

Exercise 5S Skills Practice

1 Solve each inequality.

a $3x-1<14$ **b** $2b+6\geq 10$ **c** $2x+3>4$

d $4y+11\leq 3$ **e** $3x-7>1$ **f** $9x-20<43$

g $3+2a\geq 14$ **h** $5x+2\leq -3$ **i** $8y-15>-1$

j $13-x<22$ **k** $5p+9\geq 7$ **l** $15-3x\leq 11$

2 Find the set of values of x for which

a $4x>3x+5$ **b** $7x-8\leq 3x$ **c** $5x+1<4x+9$

d $6x\leq 4x+5$ **e** $3(x+2)>9$ **f** $5x-4\geq 7x$

g $5(x+3)<8x$ **h** $9x+2\leq 5x+5$ **i** $3x+1>6x+10$

j $x-3\geq \frac{1}{2}x+1$ **k** $2(x+4)<3(3-x)$ **l** $9-2x>x+6$

m $6-2(5-3x)\leq 0$ **n** $9-3x\geq 1-7x$ **o** $7(2x+3)-5x<9$

3 Solve each inequality.

a $(x-3)(x-5)<0$ **b** $(x-3)(x-5)>0$ **c** $(2x-1)(x+4)\leq 0$

d $x^2+6x+5>0$ **e** $a^2+10a+21\geq 0$ **f** $x^2-3x+2<0$

g $x^2-6x\geq 0$ **h** $x^2+x-6\leq 0$ **i** $18+3y-y^2>0$

j $2a^2+3a+1>0$ **k** $5x^2-11x+2\leq 0$ **l** $b^2+21b+108<0$

m $3x^2+5x+2\geq 0$ **n** $y^2+15y-54<0$ **o** $15-7x-2x^2\geq 0$

4 Solve each inequality, giving answers in surd form.

a $x^2-2x-2<0$ **b** $y^2+3y+1\geq 0$ **c** $x^2-6x+3>0$

d $4-b-2b^2\leq 0$ **e** $x^2-8x-4\geq 0$ **f** $5a^2+7a+1\leq 0$

5 Giving non-exact answers correct to 2 dp, find the set of values of x for which

a $x^2+9x+20>0$ **b** $x^2-2x<3$ **c** $x^2-5x+1\leq 0$

d $6x^2+3x>7$ **e** $2x(4x-5)+3\geq 0$ **f** $x^2<3-x$

g $(x-2)^2>5x-4$ **h** $2x(3-x)\leq x-12$ **i** $x(7-2x)\geq (x+1)^2$

6 Solve each inequality, giving non-exact answers in surd form.

a $4x(3x-2)\geq 0$ **b** $x^2-2\leq \frac{1}{6}x$ **c** $4-b-\frac{1}{4}b^2>0$

d $20y^2-43y+14\geq 0$ **e** $\frac{1}{2}x(2-x)<-60$ **f** $6x^2-8x\leq 1$

Exercise 5S Skills Practice

1 **a** $x<5$ **b** $b\geq 2$ **c** $x>1/2$ **d** $y\leq -2$
e $x>8/3$ **f** $x<7$ **g** $a\geq 11/2$ **h** $x\leq -1$
i $y>7/4$ **j** $x>-9$ **k** $p\geq -2/5$ **l** $x\geq 4/3$

2 **a** $x>5$ **b** $x\leq 2$ **c** $x<8$ **d** $x\leq 5/2$
e $x>1$ **f** $x\leq -2$ **g** $x>5$ **h** $x\leq 3/4$
i $x<-3$ **j** $x\geq 8$ **k** $x<1/5$ **l** $x<1$
m $x\leq 2/3$ **n** $x\geq -2$ **o** $x<-4/3$

3 **a** $3<x<5$ **b** $x<3, x>5$ **c** $-4\leq x\leq 1/2$
d $x<-5, x>-1$ **e** $a\leq -7, a\geq -3$
f $1<x<2$ **g** $x\leq 0, x\geq 6$
h $-3\leq x\leq 2$ **i** $-3<y<6$
j $a<-1, a>-1/2$ **k** $1/5\leq x\leq 2$
l $-12<b<-9$ **m** $x\leq -1, x\geq -2/3$
n $-18<y<3$ **o** $-5\leq x\leq 3/2$

Exercise 5E Exam Practice

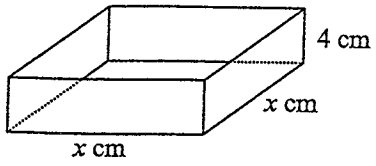
1 **a** Solve the equation

$$y(y-3) = 10(y-4).$$ **(3 marks)**

b Hence, or otherwise, find the set of values of y for which

$$y(y-3) \geq 10(y-4).$$ **(2 marks)**

2



The diagram shows an open-topped box in the shape of a cuboid of height 4 cm and with a square base of side x cm.

Given that the area of card used to make the box must be no more than 192 cm^2,

a write down an inequality that x must satisfy. **(3 marks)**

Given also that the volume of the box must be greater than 100 cm^3,

b write down another inequality that x must satisfy. **(2 marks)**

c By solving your inequalities, find the set of possible values of x. **(5 marks)**

3 Find the set of values of x for which

$$(2x-1)(x-3) < 6(x-2).$$ **(5 marks)**

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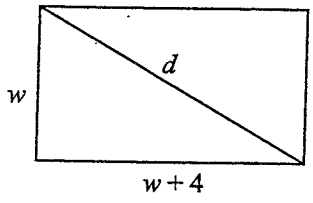

The diagram shows a rectangular garden of width w metres and length $(w+4)$ metres.

a Show that if the length of the garden's diagonal is d metres, then

$$d^2 = 2w^2 + 8w + 16.$$ **(2 marks)**

Given also that d must be at least twice as big as w,

b show that the maximum value of w can be expressed in the form $(a + b\sqrt{3})$ metres where a and b are integers to be found. **(6 marks)**

Exercise 5E Exam Practice

1 **a** 5, 8 **b** $y \leq 5, y \geq 8$

2 **a** $x^2 + 16x \leq 192$ **b** $4x^2 > 100$
c $5 < x \leq 8$

3 $^3/_2 < x < 5$

4 **b** $2 + 2\sqrt{3}$

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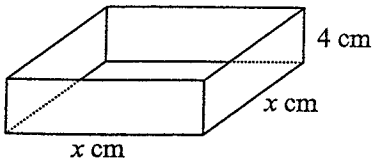

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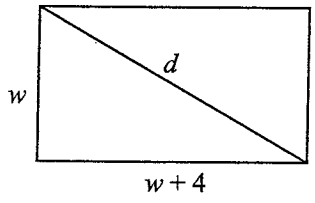

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