Quadratic Inequalities Exam Questions

Q1. Solve $(4x - 3)(x + 5) < 0$

.....

(Total 2 marks)

Q2. Solve $(3x - 1)(5x + 2) < 0$

.....

(Total 2 marks)

Q3. Solve $2x^2 + 3x - 2 > 0$

.....

(Total 3 marks)

Q4. Solve $x^2 > 3x + 4$

.....

(Total 3 marks)

Q5. Solve the inequality $x^2 > 3(x + 6)$

.....

(Total 4 marks)

Q6. (a) Factorise $6x^2 - 5x - 4$

.....

(2)

(b) Hence, or otherwise, solve $6x^2 - 5x - 4 < 0$

.....

(2)

(Total 4 marks)

Q7. Find algebraically the set of values of x for which

$x^2 - 49 > 0$ and $5x^2 - 31x - 72 > 0$

.....

(Total 5 marks)

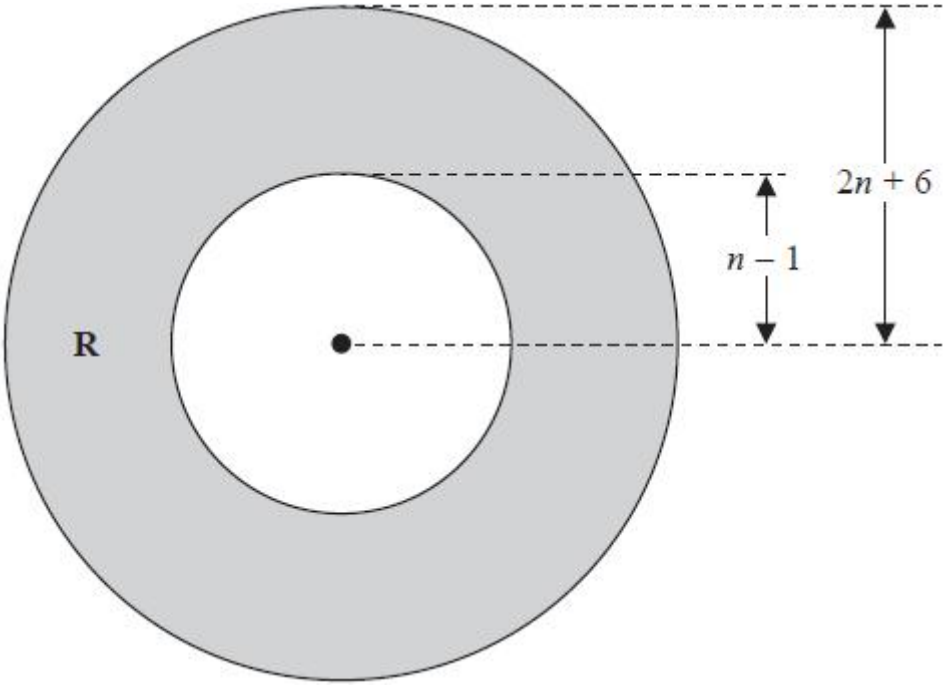
Q8. n is an integer such that $3n + 2 \leq 14$ and $\frac{6n}{n^2+5} > 1$

Find all the possible values of n.

.....

(Total 5 marks)

Q9. The region $\boldsymbol{R}$, shown shaded in the diagram, is the region between two circles with the same centre.

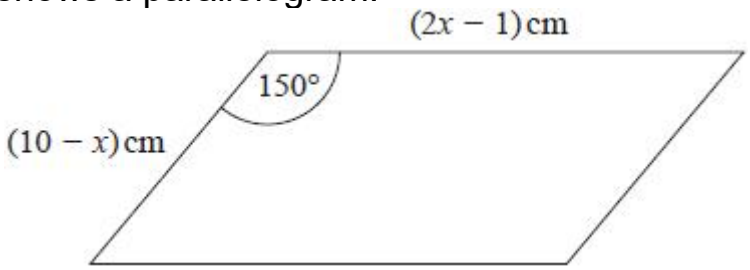


The outer circle has radius $(2n + 6)$
The inner circle has radius $(n - 1)$
All measurements are in centimetres.
The area of $\boldsymbol{R}$ is greater than the area of a circle of radius $(n + 13)$ cm.
n is an integer.
Find the least possible value of n.
You must show all of your working.

.....

(Total 5 marks)

Q10. The diagram shows a parallelogram.



The area of the parallelogram is greater than 15 cm^2

(a) Show that $2x^2 - 21x + 40 < 0$

(3)

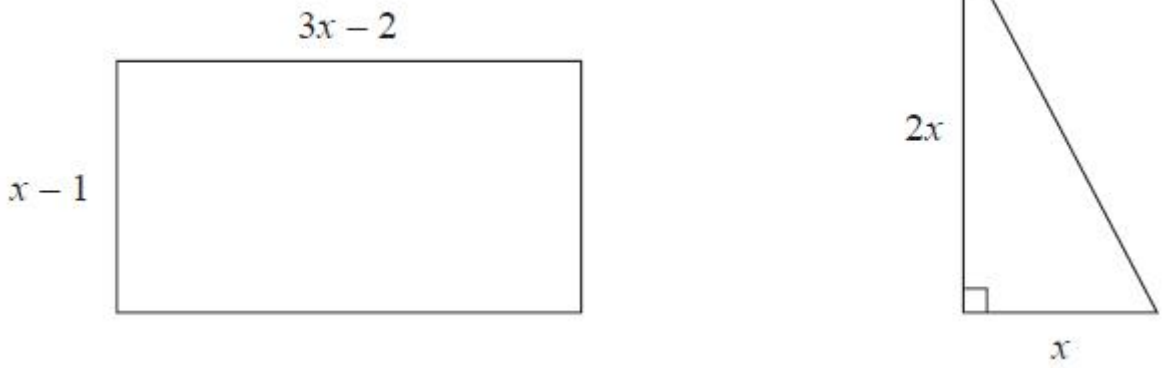
(b) Find the range of possible values of x.

……

(3)

(Total 6 marks)

Q11. Here is a rectangle and a right-angled triangle.



All measurements are in centimetres.
The area of the rectangle is greater than the area of the triangle.
Find the set of possible values of x.

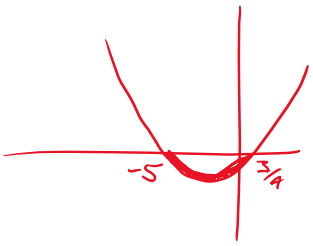
.....

(Total 5 marks)

Quadratic Inequalities Exam Questions

Q1. Solve $(4x - 3)(x + 5) < 0$

Critical values $x = \frac{3}{4}$ and -5

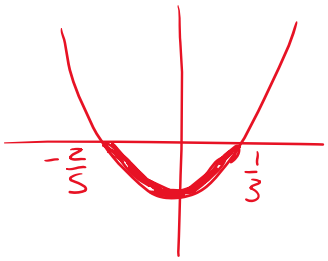


$-5 < x < \frac{3}{4}$

(Total 2 marks)

Q2. Solve $(3x - 1)(5x + 2) < 0$

Critical values $x = \frac{1}{3}$ and $-\frac{2}{5}$



$-\frac{2}{5} < x < \frac{1}{3}$

(Total 2 marks)

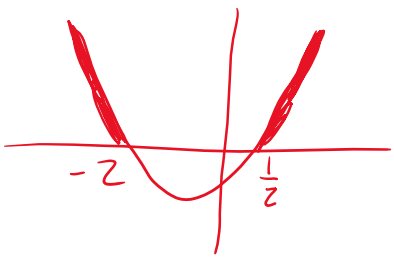
Q3. Solve $2x^2 + 3x - 2 > 0$

$(2x - 1)(x + 2) > 0$

Critical values

$x = \frac{1}{2}$ and -2

	x	$+2$
$2x$	$2x^2$	$+4x$
-1	$-x$	-2



$x < -2$ or $x > \frac{1}{2}$

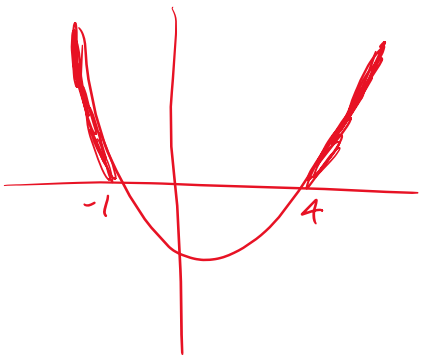
(Total 3 marks)

Q4. Solve $x^2 > 3x + 4$

$x^2 - 3x - 4 > 0$

$(x-4)(x+1) > 0$

Critical values $x = 4$ and -1



$x < -1$ or $x > 4$

(Total 3 marks)

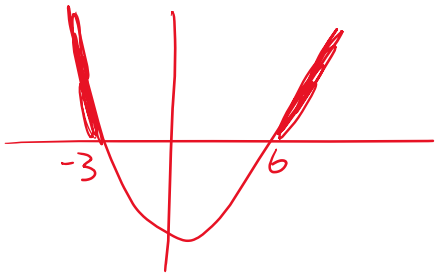
Q5. Solve the inequality $x^2 > 3(x + 6)$

$x^2 > 3x + 18$

$x^2 - 3x - 18 > 0$

$(x-6)(x+3) > 0$

Critical values $x = 6$ and $x = -3$



$x < -3$ or $x > 6$

(Total 4 marks)

Q6. (a) Factorise $6x^2 - 5x - 4$

-24

	$3x$	-4
$2x$	$6x^2$	$-8x$
$+1$	$+3x$	-4

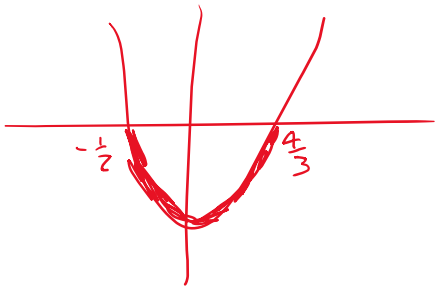
$(2x+1)(3x-4)$

(2)

(b) Hence, or otherwise, solve $6x^2 - 5x - 4 < 0$

$(2x+1)(3x-4) < 0$

Critical values $x = -\frac{1}{2}$ and $\frac{4}{3}$



$-\frac{1}{2} < x < \frac{4}{3}$

(2)

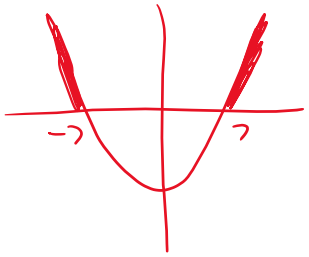
(Total 4 marks)

Q7. Find algebraically the set of values of x for which

$x^2 - 49 > 0$ and $5x^2 - 31x - 72 > 0$

$(x+7)(x-7) > 0$

$x = 7$ and -7



$x < -7$ or $x > 7$

-360

	x	-8
$5x$	$5x^2$	$-40x$
$+9$	$+9x$	-72

$(5x+9)(x-8) > 0$

$x = -\frac{9}{2}$ and 8

$x < -\frac{9}{2}$ or $x > 8$

$x < -7$ or $x > 8$

(Total 5 marks)

Q8. n is an integer such that $3n + 2 \leq 14$ and $\frac{6n}{n^2+5} > 1$

Find all the possible values of n.

$3n + 2 \leq 14$

$3n \leq 12$

$n \leq 4$

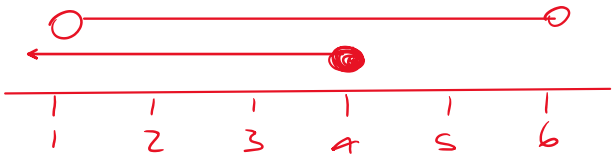
$6n > n^2 + 5$

$0 > n^2 - 6n + 5$

$0 > (n-1)(n-6)$

$n = 1$ or 6

$1 < n < 6$



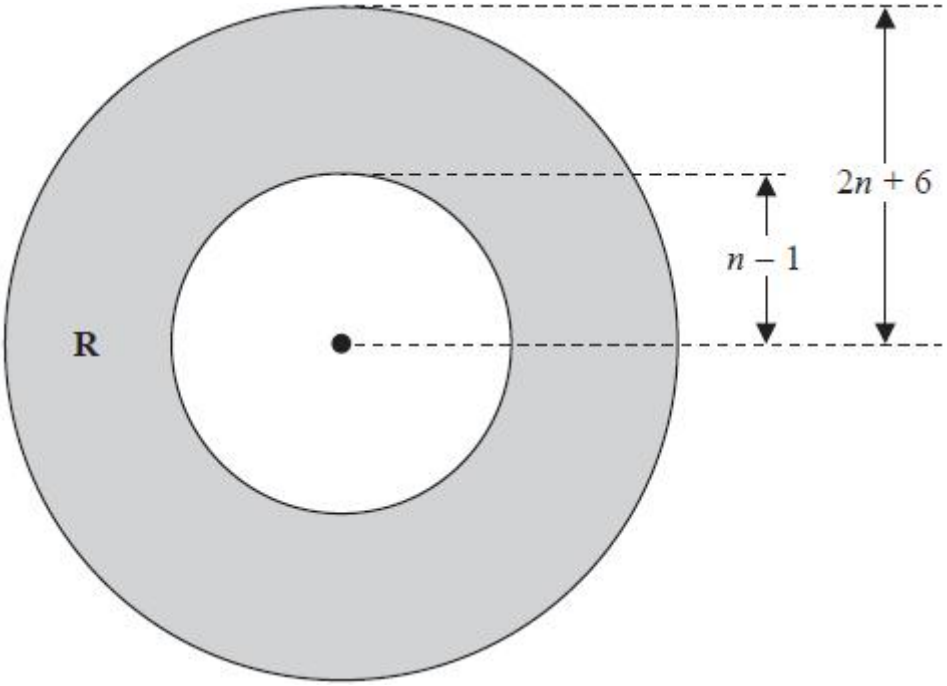
$1 < n \leq 4$

$n \in \mathbb{Z}$

$n = 2, 3, 4$

(Total 5 marks)

Q9. The region $\boldsymbol{R}$, shown shaded in the diagram, is the region between two circles with the same centre.



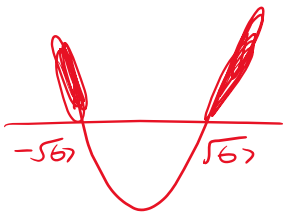
The outer circle has radius $(2n + 6)$
The inner circle has radius $(n - 1)$
All measurements are in centimetres.
The area of $\boldsymbol{R}$ is greater than the area of a circle of radius $(n + 13)$ cm.
n is an integer.
Find the least possible value of n.
You must show all of your working.

$(2n+6)^2\pi - (n-1)^2\pi > (n+13)^2\pi$

$4n^2 + 24n + 36 - n^2 + 2n - 1 > n^2 + 26n + 169$

$2n^2 - 134 > 0$

$n^2 > 67$



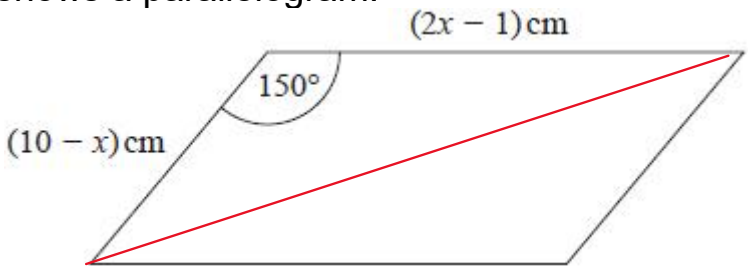
$n > 0 \therefore n = 9$

$n = 9$

.....

(Total 5 marks)

Q10. The diagram shows a parallelogram.



The area of the parallelogram is greater than 15 cm^2

(a) Show that $2x^2 - 21x + 40 < 0$

$\frac{1}{2}ab\sin C$

$\frac{1}{2} \times 2(10-x)(2x-1)\sin 150 > 15$

$20x - 2x^2 - 10 + x > 30$

$0 > 2x^2 - 21x + 40$

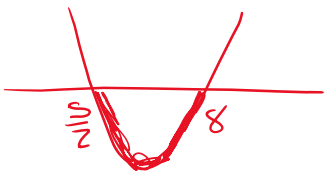
(3)

(b) Find the range of possible values of x.

x	$2x$	-5
x	$2x^2$	$-5x$
-8	$-16x$	$+40$

$(x-8)(2x-5) < 0$

Critical values $x = 8$ and $\frac{5}{2}$



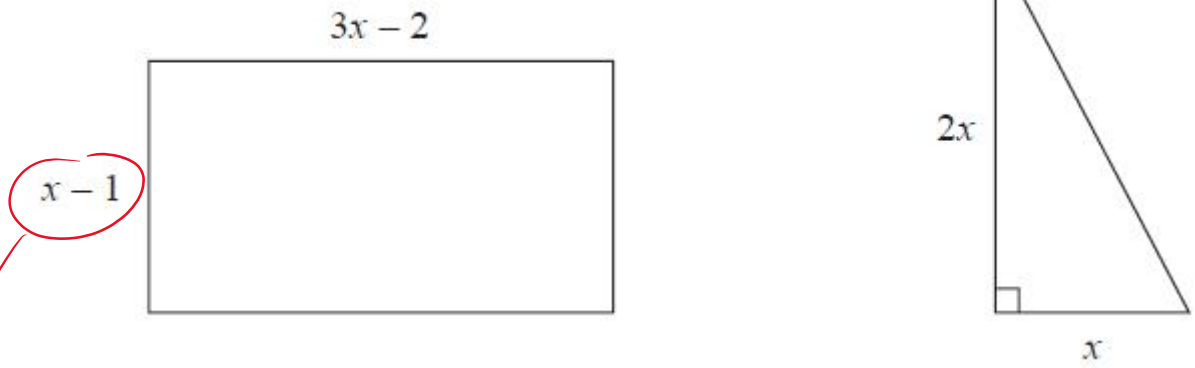
$\frac{5}{2} < x < 8$

.....

(3)

(Total 6 marks)

Q11. Here is a rectangle and a right-angled triangle.



All measurements are in centimetres.
The area of the rectangle is greater than the area of the triangle.
Find the set of possible values of x.

$(x-1)(3x-2) > \frac{1}{2} \times 2x^2$

$3x^2 - 5x + 2 > x^2$

$2x^2 - 5x + 2 > 0$

$(x-2)(2x-1) > 0$

$x = 2$ and $\frac{1}{2}$

	$2x$	-1
x	$2x^2$	$-x$
-2	$-4x$	$+2$

$x \neq \frac{1}{2} \quad \therefore x > 2$

$x > 2$

.....

(Total 5 marks)