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<p>Find the value of the following.</p> <p>(i) <math>\left(\frac{1}{3}\right)^{-2}</math> [2]</p> <p>(ii) <math>16^{\frac{3}{4}}</math> [2]</p>
<p>Simplify the following.</p> <p>(i) <math>a^0</math> [1]</p> <p>(ii) <math>a^6 \div a^{-2}</math> [1]</p> <p>(iii) <math>(9a^6b^2)^{-\frac{1}{2}}</math> [3]</p>
<p>Simplify the following.</p> <p>(i) <math>16^{\frac{1}{2}}</math> [2]</p>
<p>Find the value of each of the following, giving each answer in its simplest form.</p>
<p>(i) Find <math>a</math>, given that <math>a^3 = 64x^{12}y^3</math>. [2]</p> <p>(ii) Find the value of <math>\left(\frac{1}{2}\right)^{-5}</math>. [2]</p>

# Indices Exam Questions Solutions

1. Jan 05 Q5

$$(i) \left(\frac{1}{3}\right)^{-2} = \left(\frac{3}{1}\right)^2$$

$$(ii) 16^{3/4} = (16^{1/4})^3$$

2. Jan 05 Q6

$$(i) a^0 = 1 \quad (ii) a^6 \div a^{-2} = a^8$$

$$(iii) (9a^6b^2)^{-1/2} = \frac{1}{3}a^{-3}b^{-1}$$

$$\text{or } \frac{1}{3a^3b}$$

June 06 Q4

$$\frac{16^{1/2}}{81^{1/4}} = \frac{4}{3}$$

+ Jan 07 Q6

$$(i) 25^{3/2} = (25^{1/2})^3 = 5^3$$

$$\frac{4}{23} = 3a^{10}b^8c^{-2}$$

or  $\frac{3a^{10}b^8}{c^2}$

$$(ii) \left(\frac{7}{3}\right)^{-2} = \left(\frac{3}{7}\right)^2 = \frac{9}{49}$$

3

(i)

$\frac{4}{27}$







## Ex 10: Finding solutions - Sides

Results

$$\Delta = (\sqrt{2} + 2\sqrt{5})^2 = (\sqrt{2})^2 + 2 \cdot \sqrt{2} \cdot 2\sqrt{5} + (2\sqrt{5})^2 = 2 + 8\sqrt{10} + 20 = 22 + 8\sqrt{10}$$

Results

$$a = \sqrt{22 + 8\sqrt{10}} = \sqrt{2} + 2\sqrt{5}$$

Results

$$b = \sqrt{22 - 8\sqrt{10}} = \sqrt{2} - 2\sqrt{5}$$

Results

$$c = \sqrt{22 + 8\sqrt{10}} = \sqrt{2} + 2\sqrt{5}$$

Results

$$d = \sqrt{22 - 8\sqrt{10}} = \sqrt{2} - 2\sqrt{5}$$

Results

$$e = \sqrt{22 + 8\sqrt{10}} = \sqrt{2} + 2\sqrt{5}$$

Results

$$f = \sqrt{22 - 8\sqrt{10}} = \sqrt{2} - 2\sqrt{5}$$

Results

$$g = \sqrt{22 + 8\sqrt{10}} = \sqrt{2} + 2\sqrt{5}$$

Results

$$h = \sqrt{22 - 8\sqrt{10}} = \sqrt{2} - 2\sqrt{5}$$

Results

$$i = \sqrt{22 + 8\sqrt{10}} = \sqrt{2} + 2\sqrt{5}$$

Results

$$j = \sqrt{22 - 8\sqrt{10}} = \sqrt{2} - 2\sqrt{5}$$







Express  $x^2 + 5x + 7$  in the form  $(x + p)^2 + q$ , where  $p$  and  $q$  are rational numbers. (3 marks)

(b) The curve has equation  $y = x^2 + 5x + 7$ .

(i) Find the coordinates of the vertex of the curve. (2 marks)

(ii) State the equation of the line of symmetry of the curve. (1 mark)

Information that maps  $y = x^2 + 5x + 7$  to  $y = x^2 + 5x + 7$ .

(a) Factorise  $x^2 - 4x - 12$ . (1 mark)

(b) Sketch the graph with equation  $y = x^2 - 4x - 12$ , stating the values where the curve crosses the coordinate axes. (4 marks)

(c) (i) Express  $x^2 - 4x - 12$  in the form  $(x - p)^2 - q$ , where  $p$  and  $q$  are positive integers. (2 marks)

(ii) Hence find the minimum value of  $x^2 - 4x - 12$ . (1 mark)

The curve with equation  $y = x^2 - 4x - 12$  is shown in the diagram.



(a) Use the result from part (a)(i) to show that the equation  $x^2 + 6x + 11 = 0$  has no real solutions. (2 marks)

(b) A curve has equation  $y = x^2 - 6x + 11$ .

(i) Find the coordinates of the vertex of the curve.

(ii) Sketch the graph of the curve  $y = x^2 - 6x + 11$  onto the curve with equation  $y = x^2$ .

(a) (i) Find the coordinates of the vertex of the curve  $y = x^2 - 6x + 11$ .

(ii) Sketch the graph of the curve  $y = x^2 - 6x + 11$  onto the curve with equation  $y = x^2$ .









4 June 2005

(a) (i)  $x^2 - 3x + 20$

$$\equiv (x - 3/2)^2 - \frac{9}{4} + \frac{20}{4}$$

$$\equiv (x - 3/2)^2 + \frac{11}{4} \quad (A1)$$

(ii) line of symmetry is  $x = 3/2$  (B1)

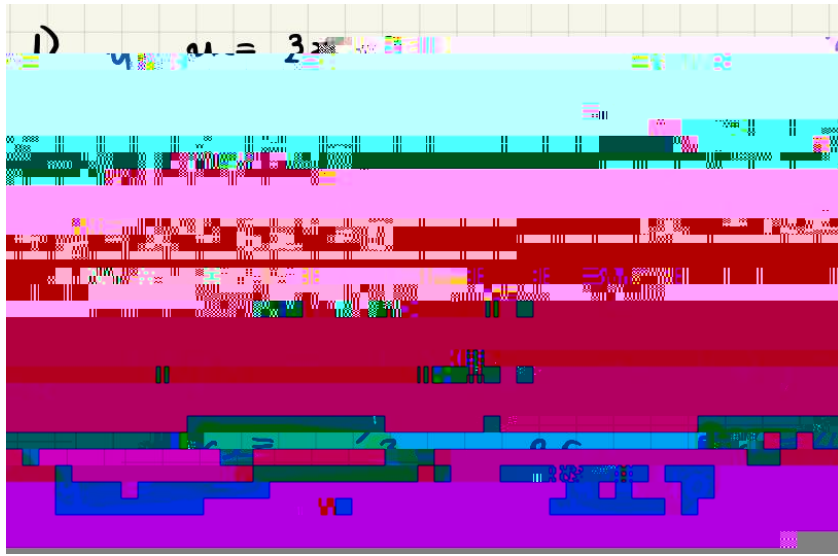


(M)(A1)

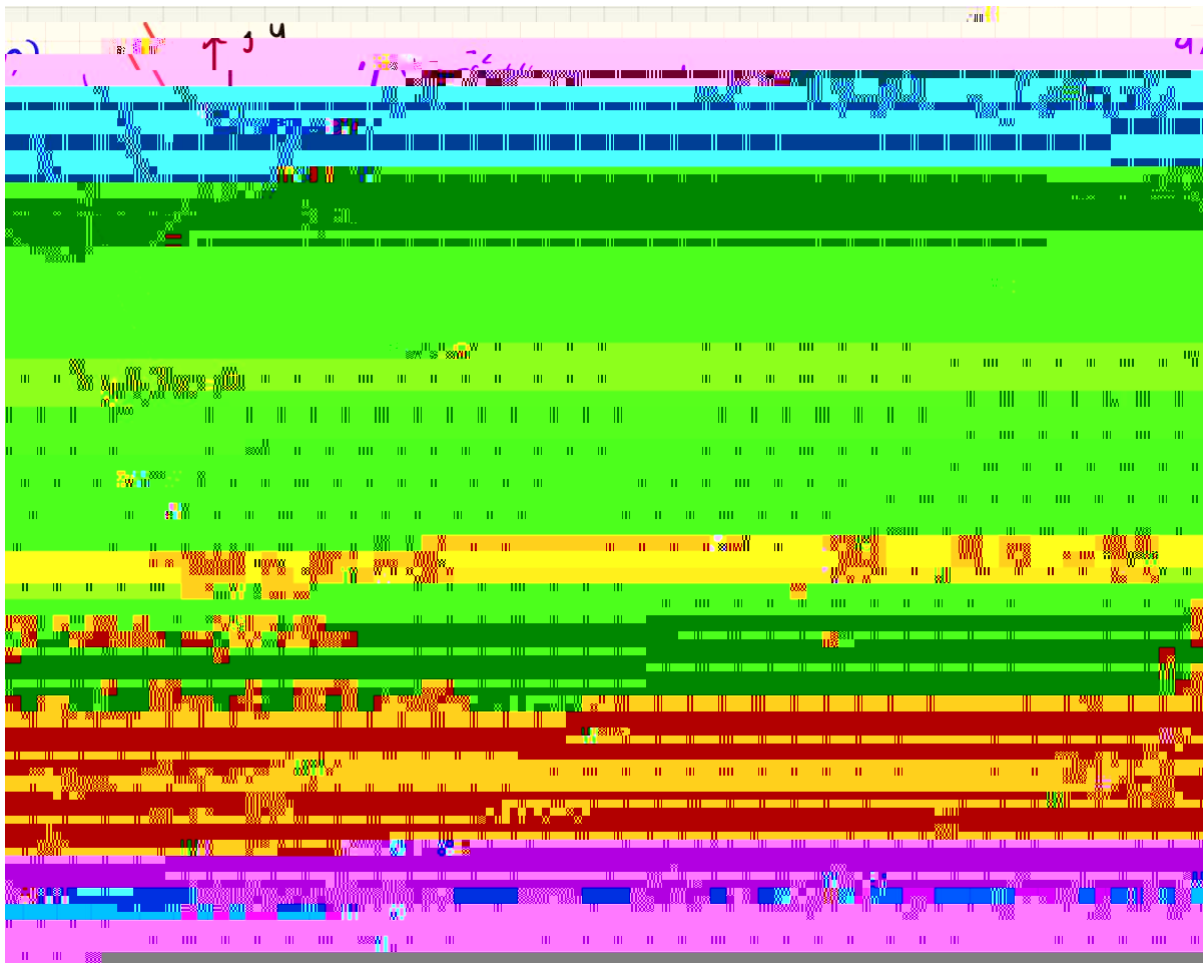
$$(ii) (x - 3)^2 + 7$$



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2)



Jan 11 07

$$y = 4 - 10x + x^2 \quad y = R(4x - 13)$$

0.10x - 1.11





(iii) Solve the inequality  $4k^2 + 33k + 29 > 0$ .

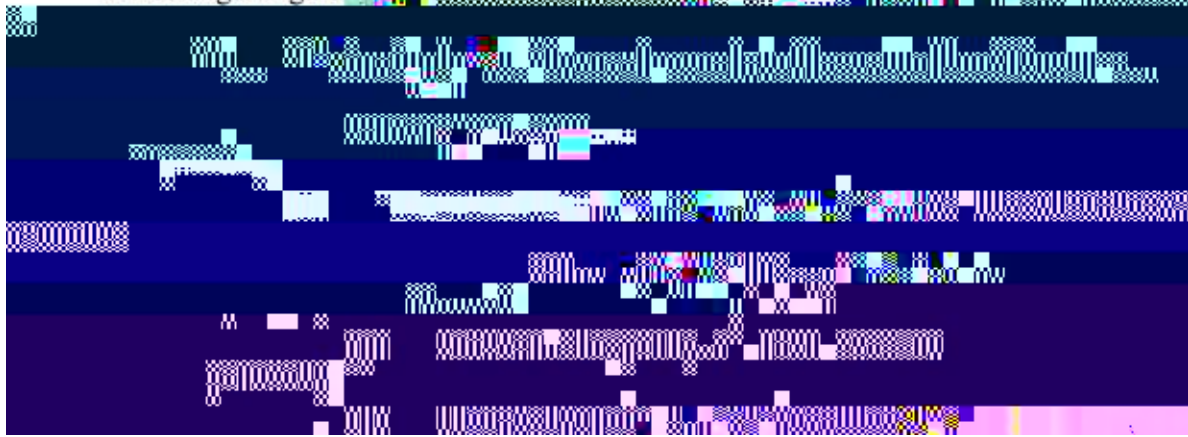
(4 marks)

Solve each of the following inequalities.

(a)  $2(4 - 3x) > 5 + (x + 2)$ ;  
(2 marks)

(b)  $2x^2 + 5x \geq 12$ .  
(4 marks)

A rectangular garden

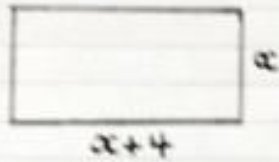


(ii) Solve the inequality  $3x^2 - 10x + 8 < 0$ .

(4 marks)



3 Jan 12 Q6



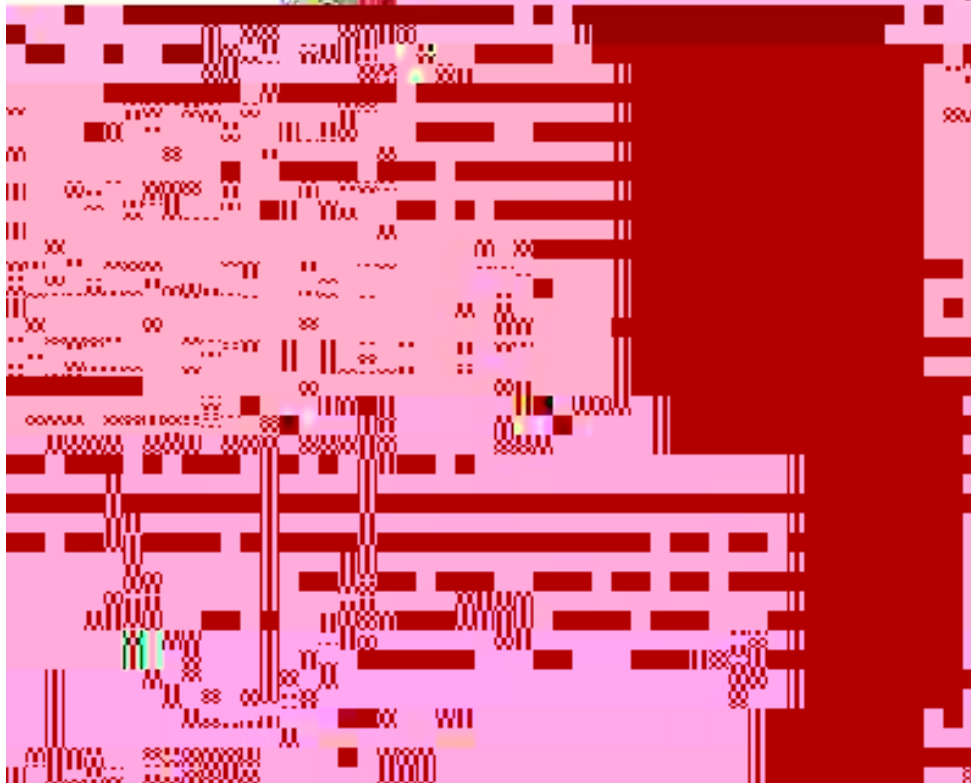
(a)

$$x + x + x + 4 > 30$$

$$4x + 8 > 30$$

$$4x > 22$$

$$x > 5.5$$



(b)

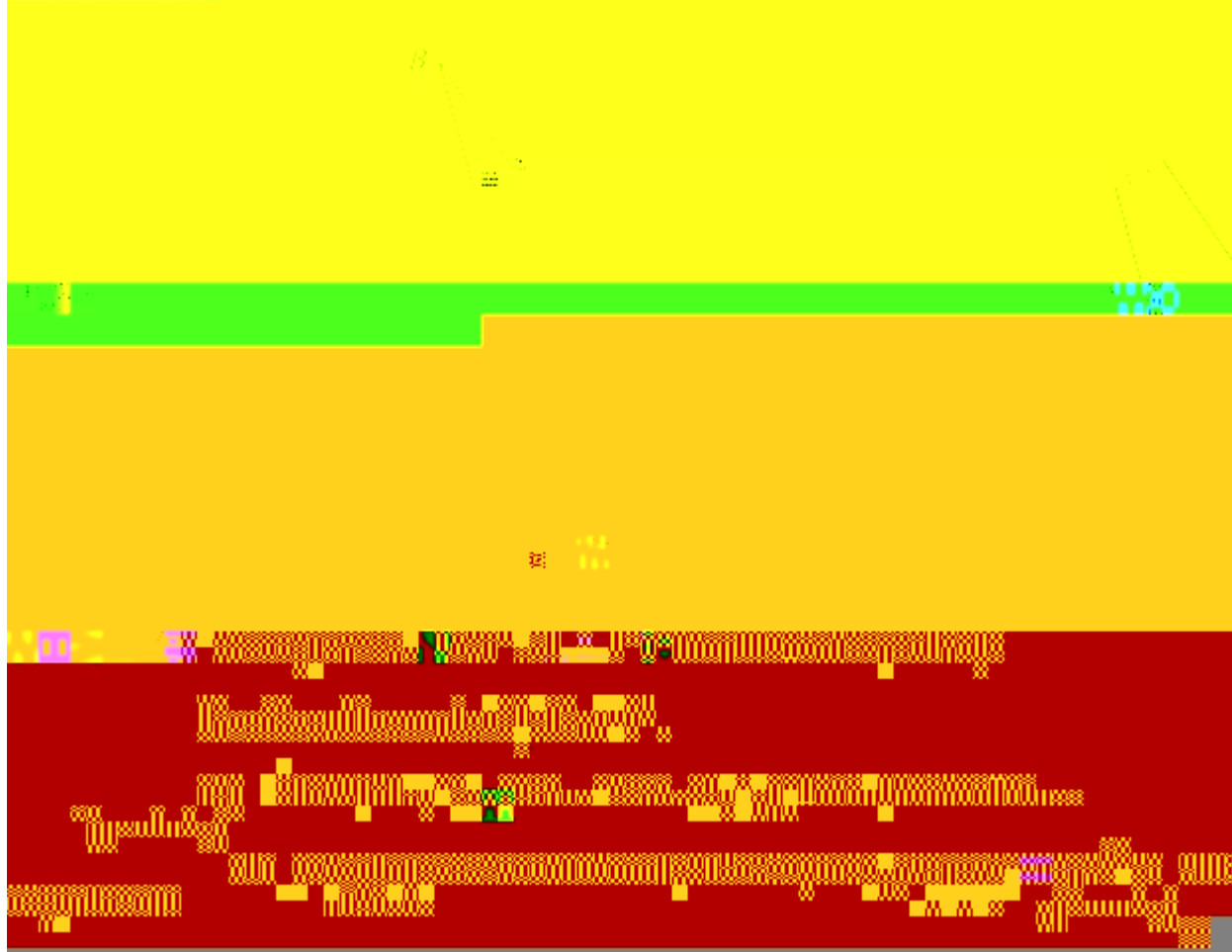








The diagram shows a triangle  $ABC$ .



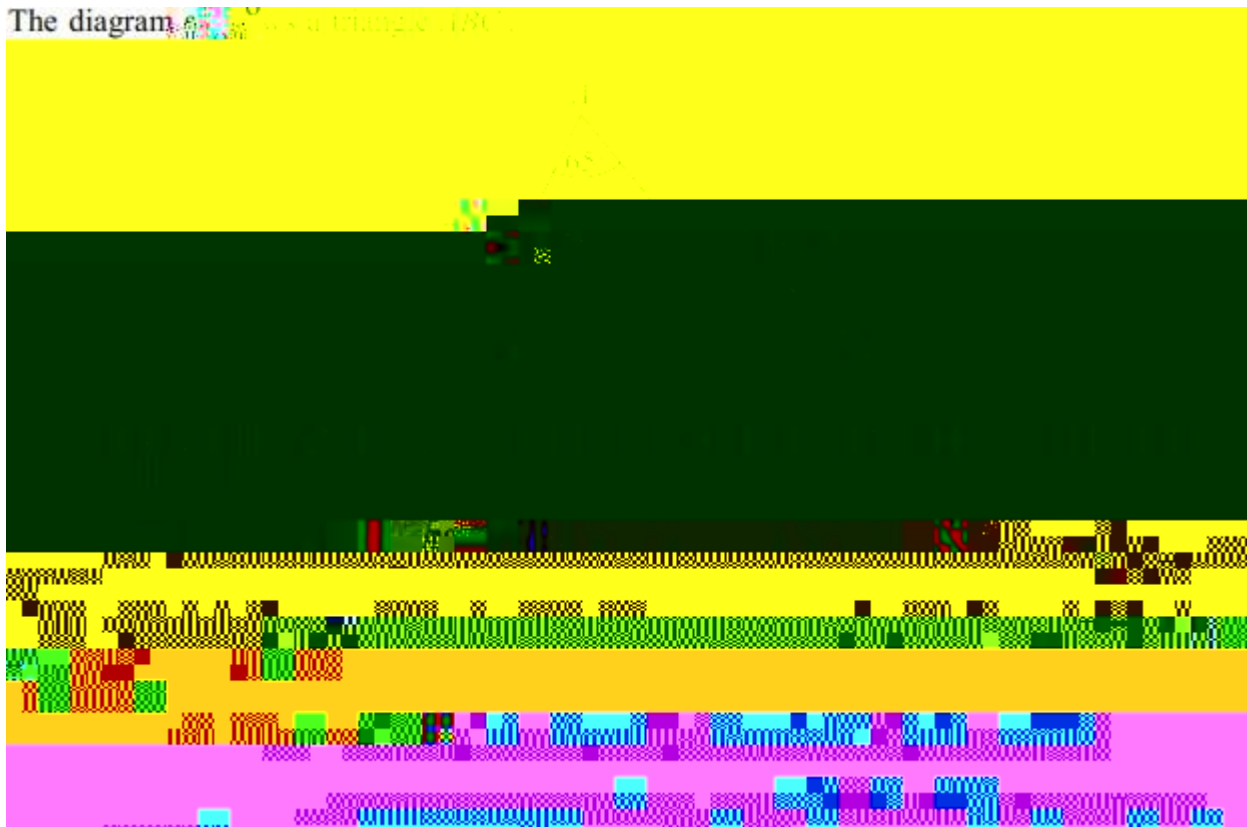
The triangle  $ABC$ , shown in the diagram, is such that  $BC = 6$  cm,  $AC = 5$  cm and  $AB = 7$  cm. The angle  $BCA$  is  $120^\circ$ .



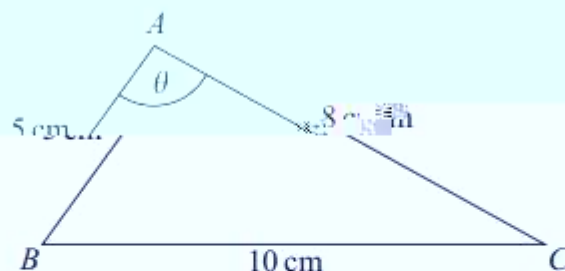
(c) Hence find the area of the triangle  $ABC$ .

(2 marks)

The diagram shows a triangle  $ABC$ .



The triangle has side lengths  $AB = 5 \text{ cm}$ ,  $AC = 8 \text{ cm}$  and angle  $BAC = \theta$ .



State the value of  $\theta$  correct to the nearest  $0.1^\circ$ .

(3 marks)

(b) (i) Calculate the area of triangle  $ABC$ , giving your answer, in  $\text{cm}^2$ , to three significant figures.

(2 marks)

(ii) The line through  $A$ , perpendicular to  $BC$ , meets  $BC$  at the point  $D$ . Calculate the length of  $AD$ , giving your answer to three significant figures.

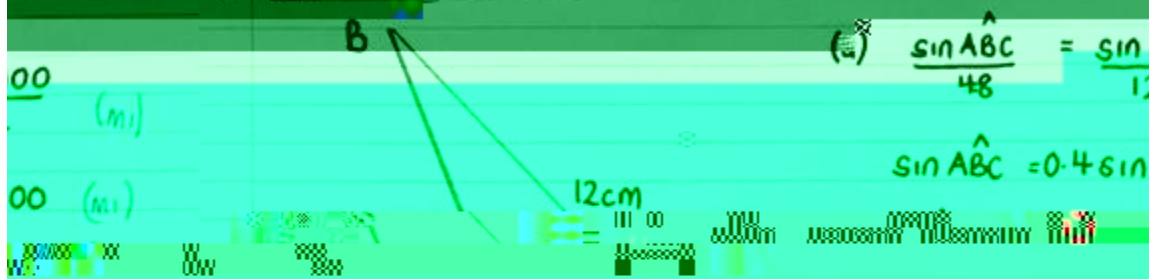
(3 marks)

The diagram shows a triangle  $ABC$



## Triangle (Cont): Easy Exit Questions

1. Q1




$$(a) \frac{\sin \hat{A}BC}{48} = \frac{\sin \hat{C}}{120}$$

$$\sin \hat{A}BC = 0.4 \sin \hat{C}$$





























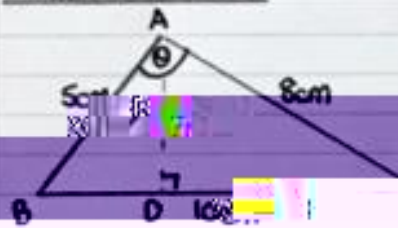








4. Jan 2011 Q3



$$10^2 = 5^2 + 8^2 - 2(5)(8)\cos\theta$$

$$100 = 29 - 80\cos\theta$$

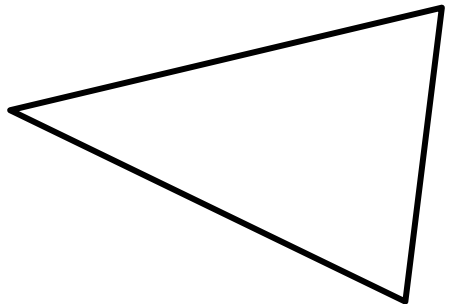
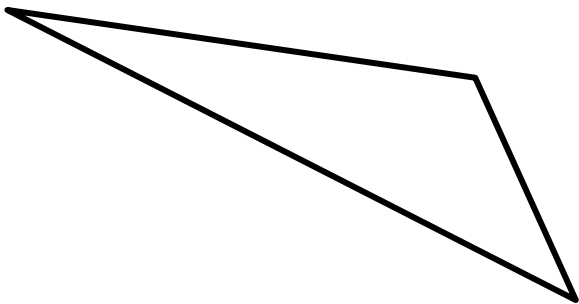
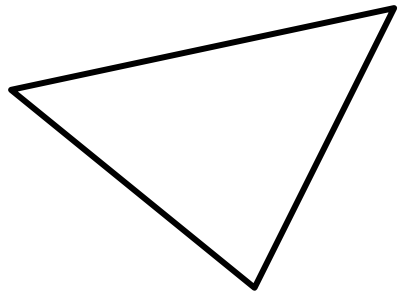
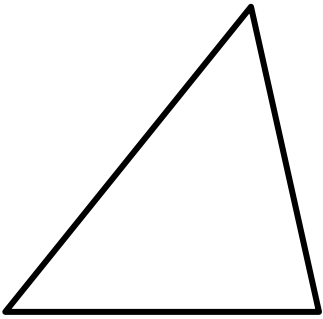
$$80\cos\theta = -71$$

$$= 18.8\text{ cm}^2 \text{ to 3 s.f. (A)}$$

END







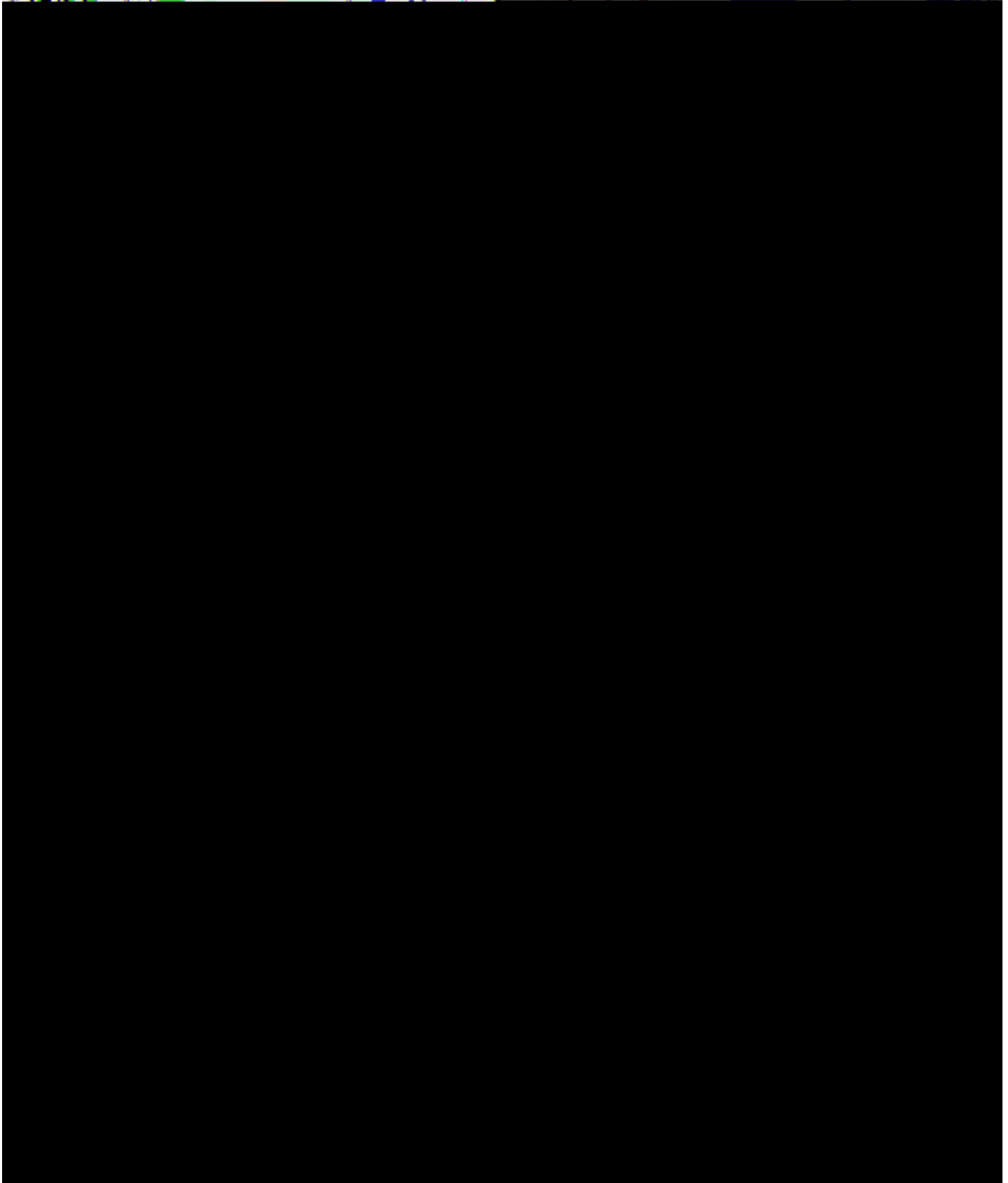
# Practice 1

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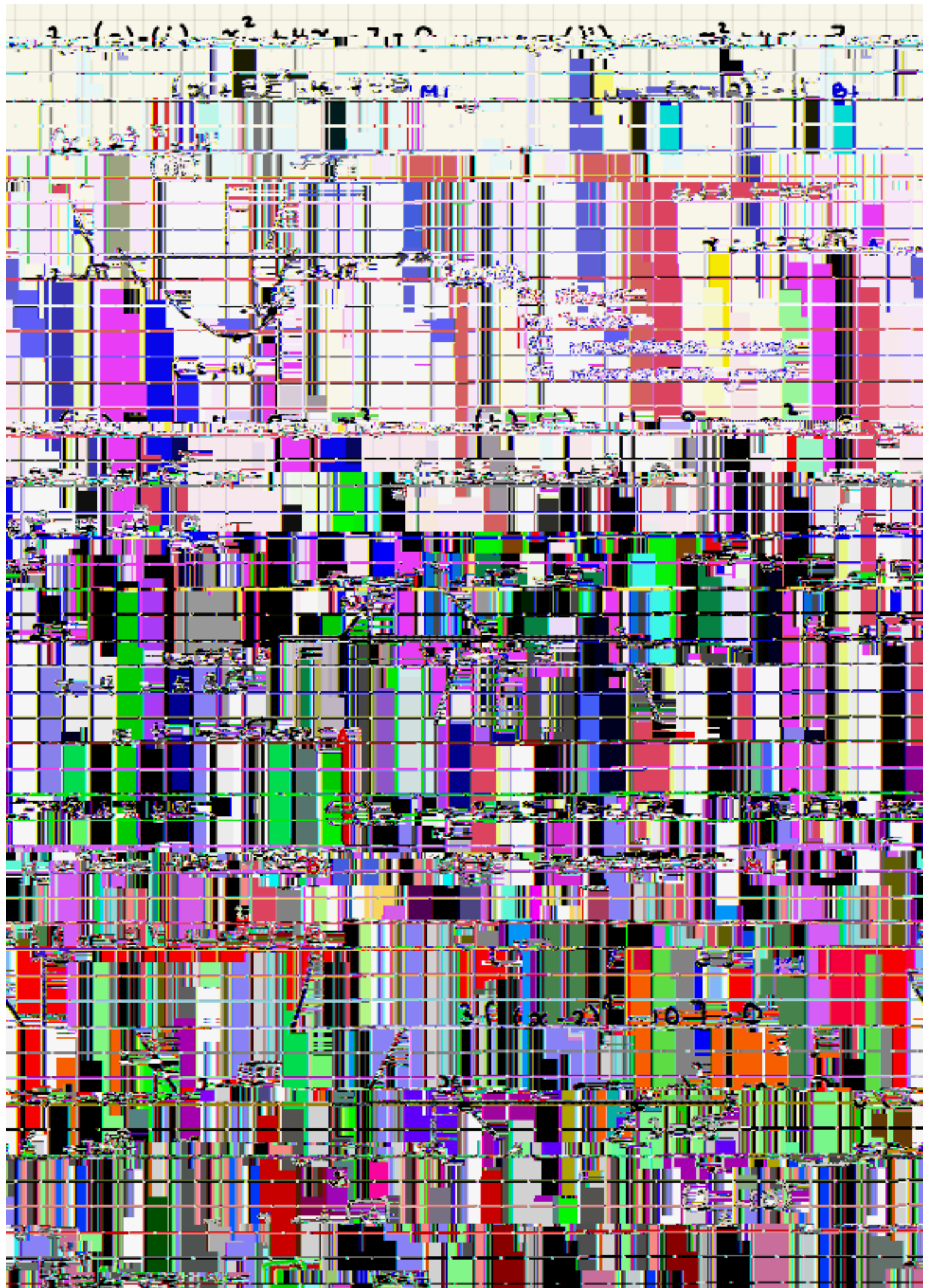
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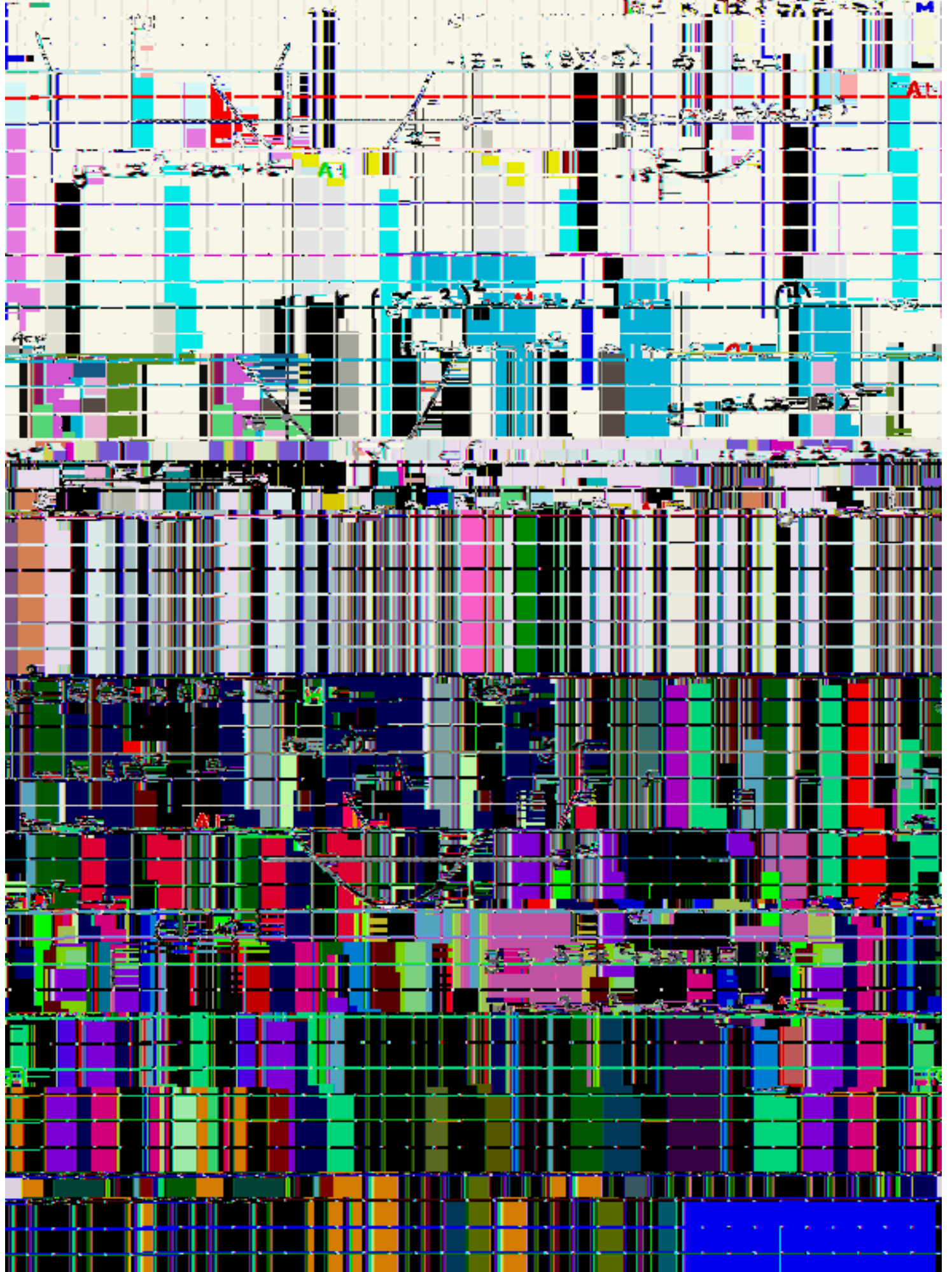
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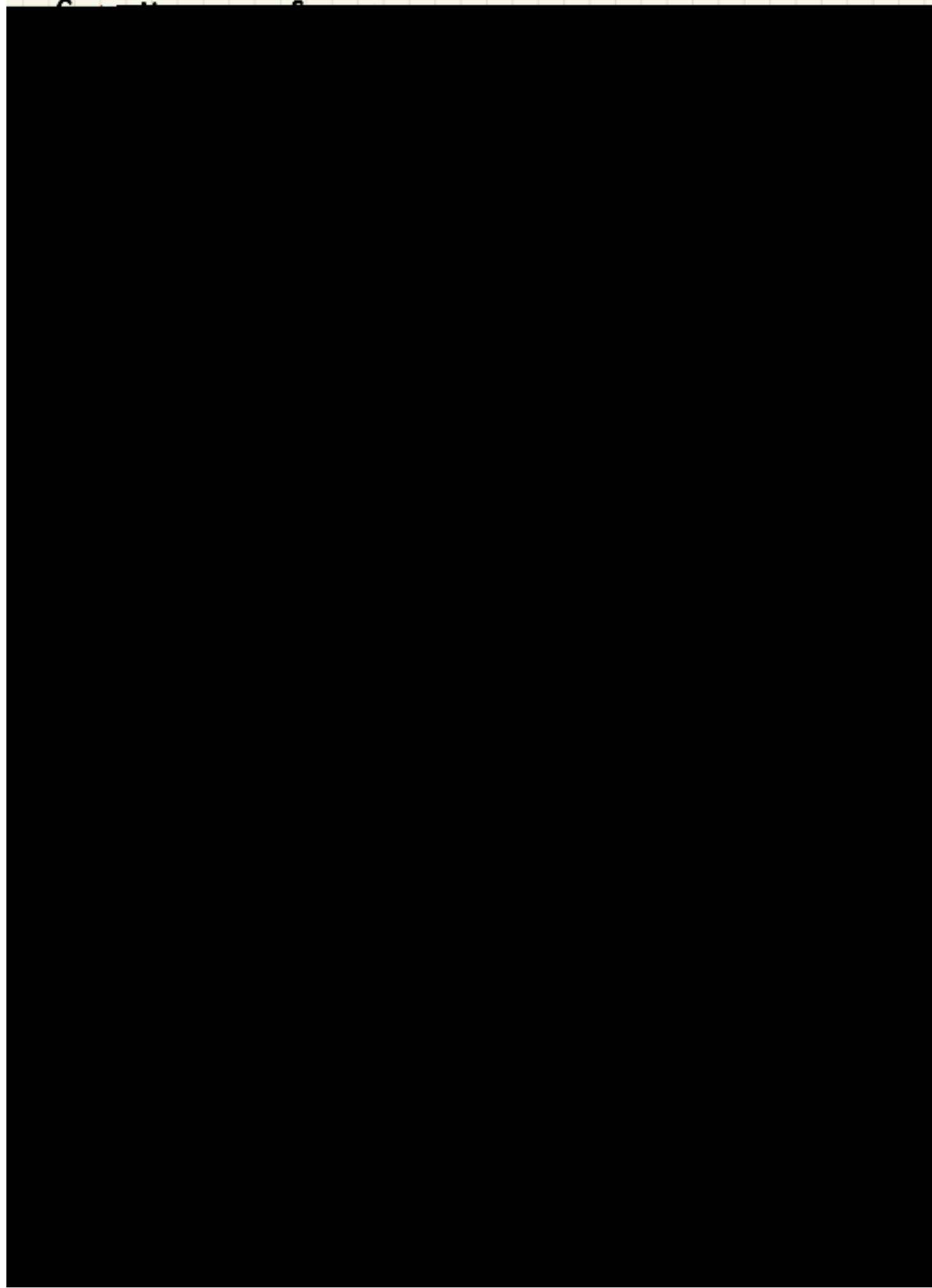






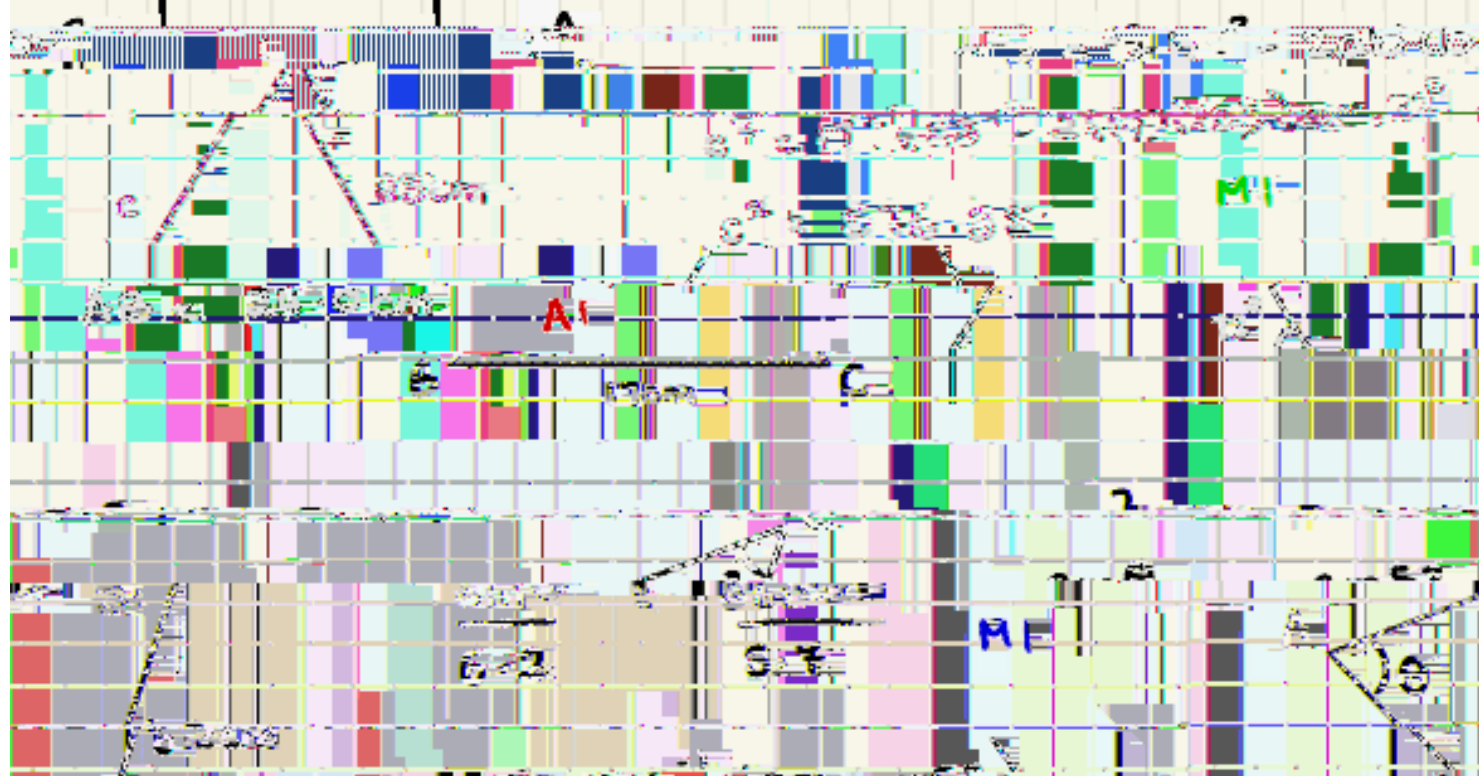
3. (a)







# Triangle Geometry





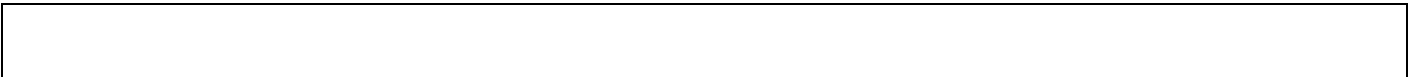
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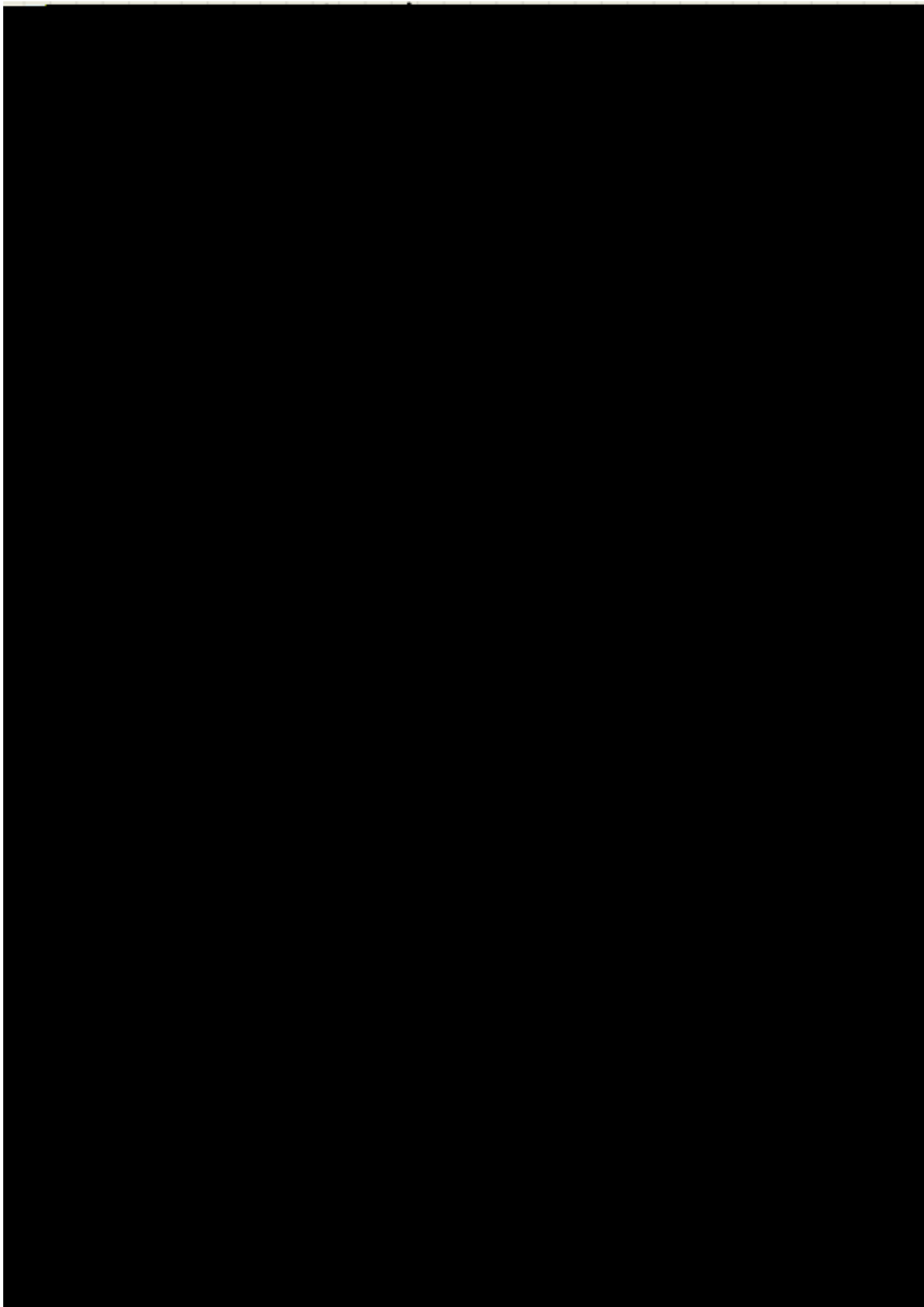
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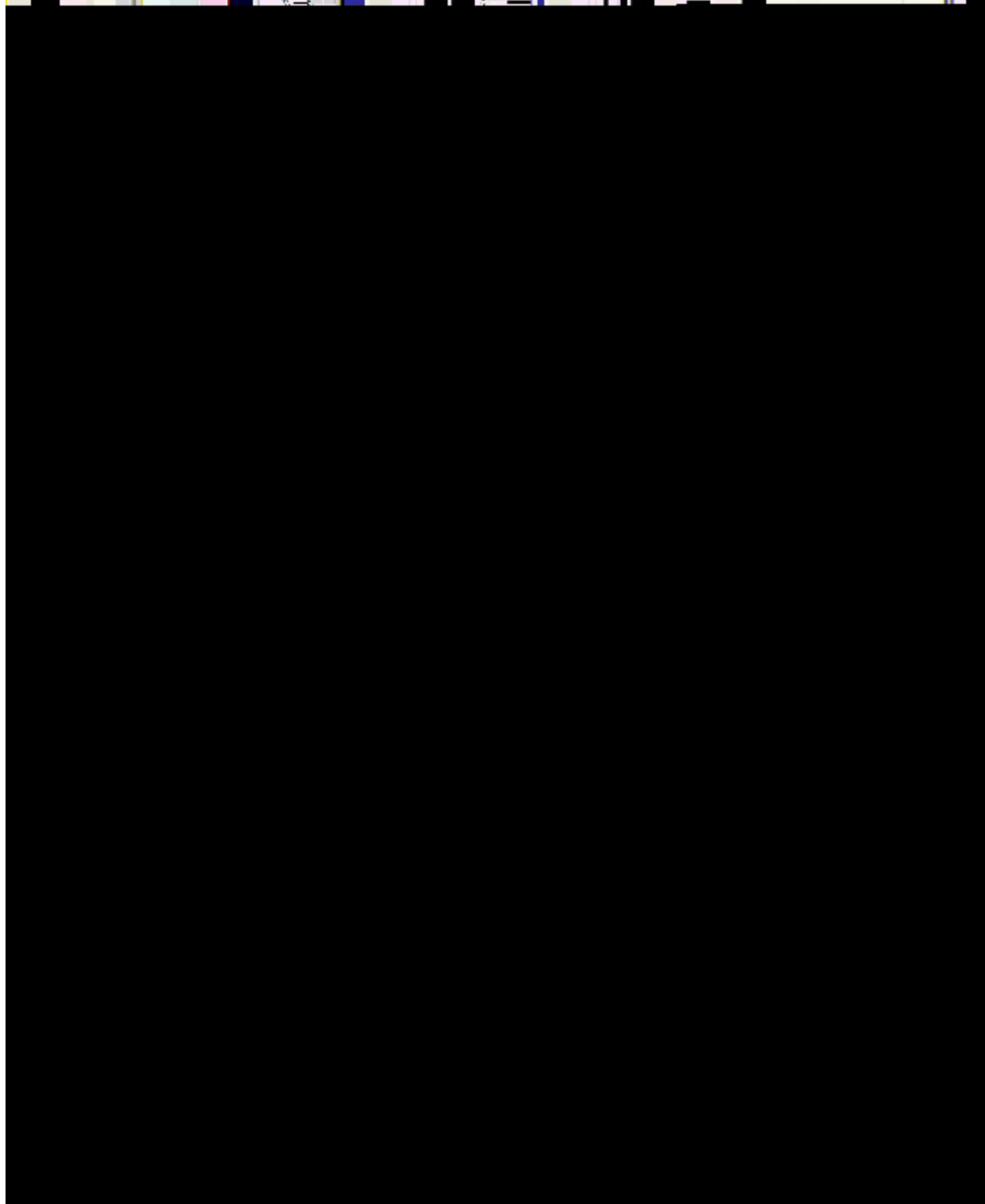


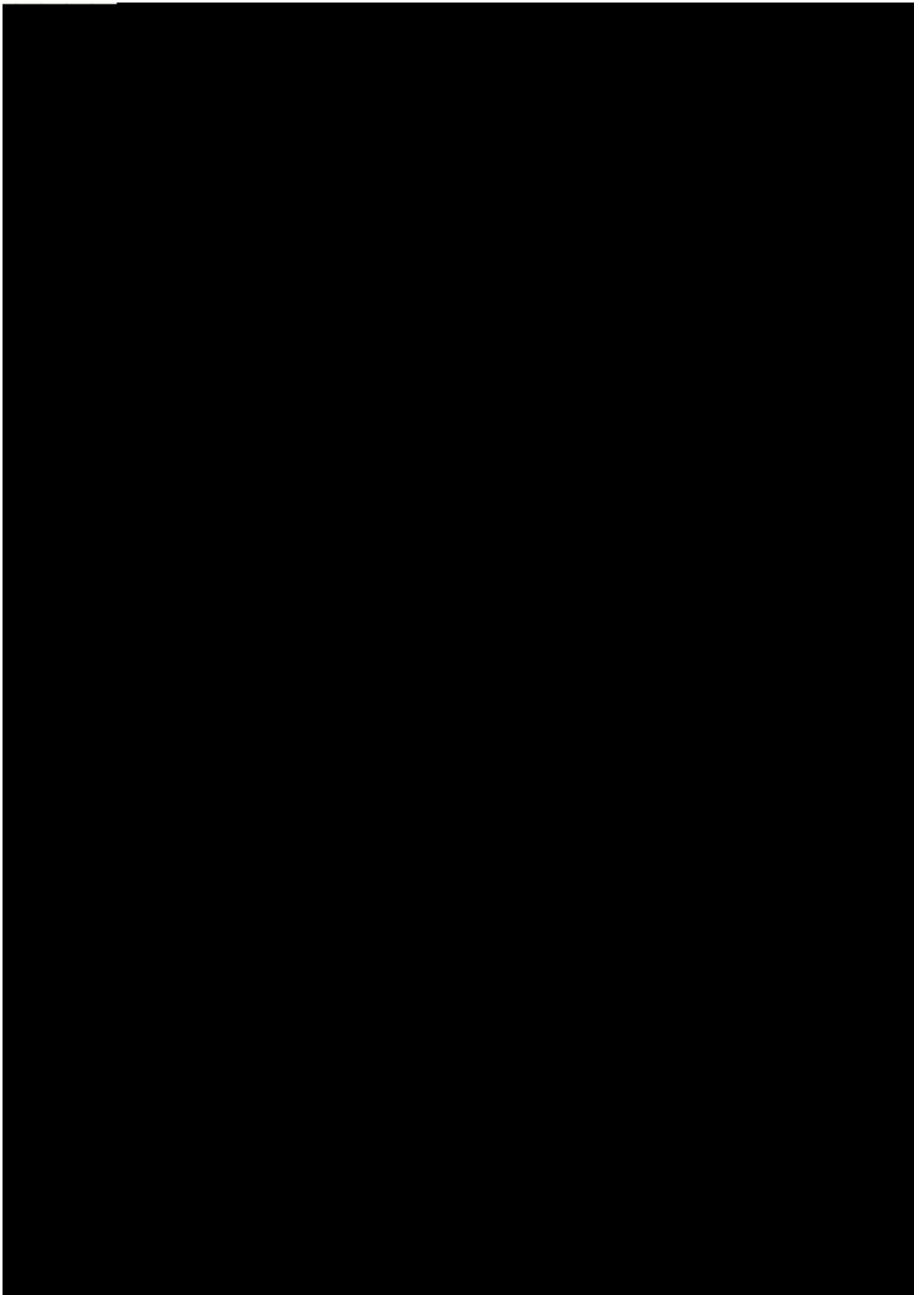




# B3 Quadratics

$$ax^2 + bx + c = 0 \quad \text{Quadratic Formula}$$





3. (a)

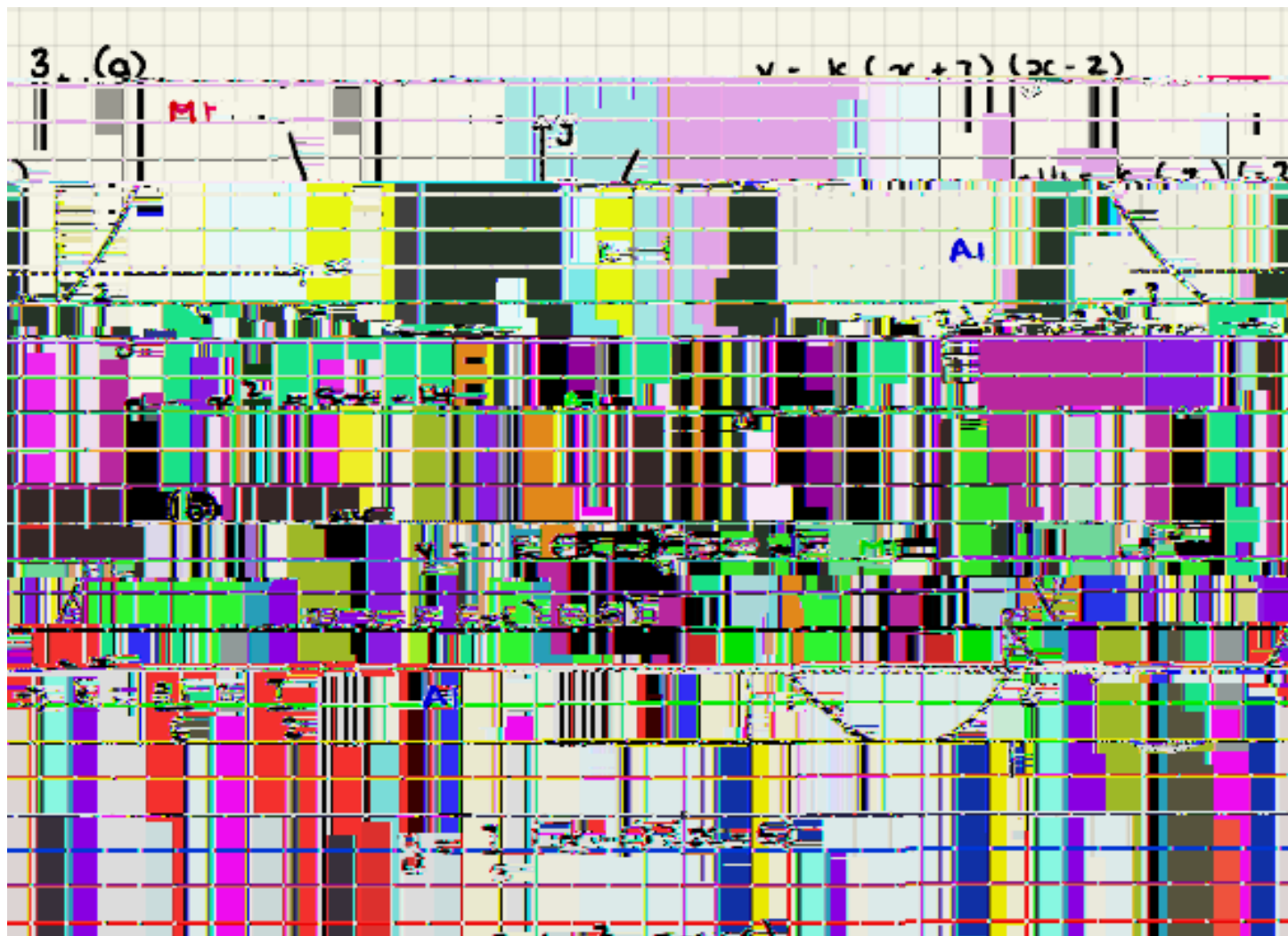
$$v = k(x+7)(x-2)$$

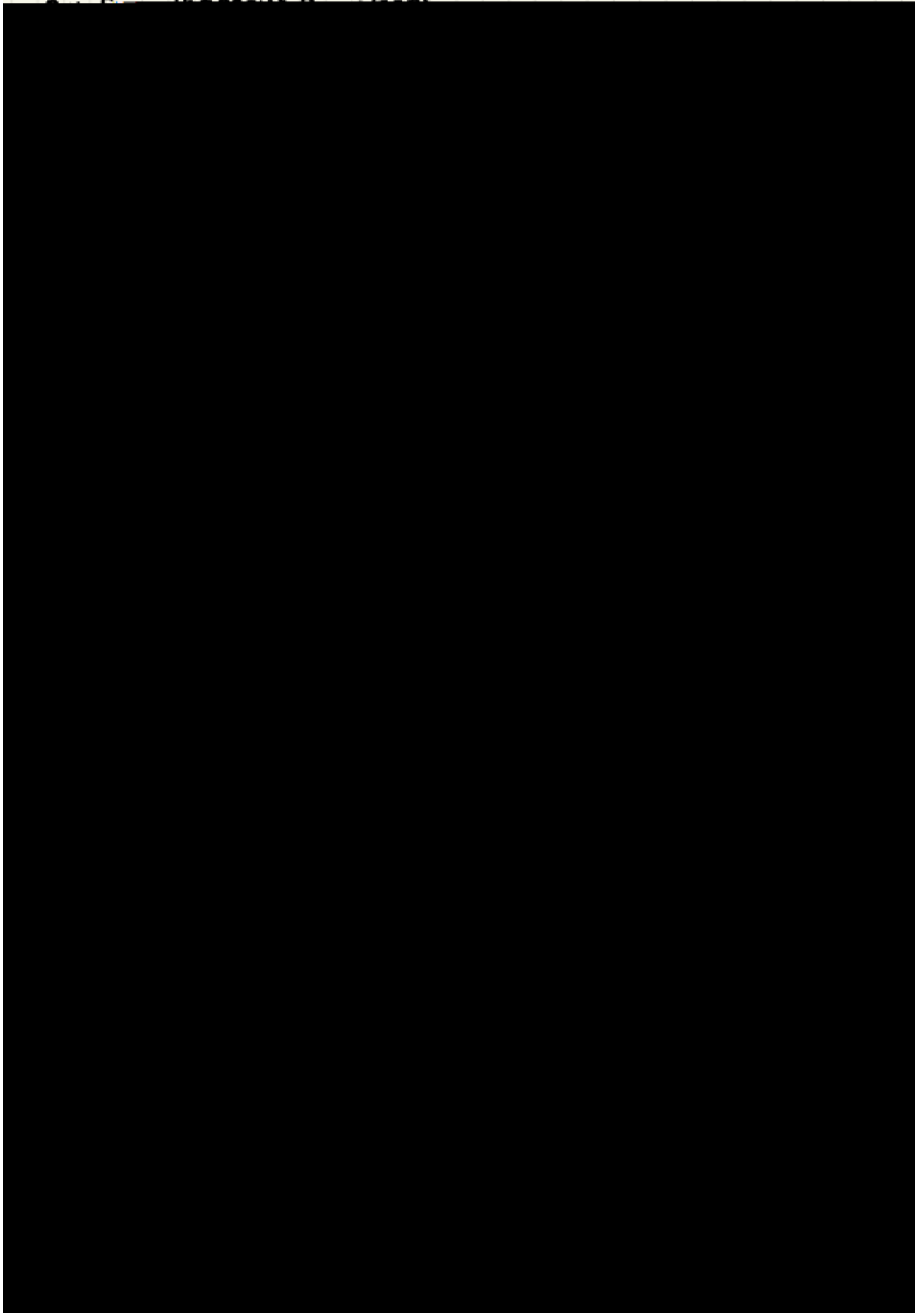
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# BS Inequalities

Handwritten mathematical notes on grid paper, including the title "BS Inequalities" and several equations. The equations are:

$$y_1 = 2F - G_3$$
$$y_2 = 2y_1$$
$$y_3 = 2y_2$$
$$y_4 = 2y_3$$
$$y_5 = 2y_4$$
$$y_6 = 2y_5$$
$$y_7 = 2y_6$$

The notes also include a diagram of a tree structure with nodes labeled  $y_1$  through  $y_7$  and arrows indicating relationships. There are also some scribbles and other markings on the page.

