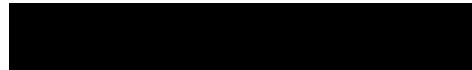


EXHIBIT 8



IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

ALIGN TECHNOLOGY INC.,
Plaintiff,
v.

Case No. 6:24-CV-00187-ADA-DTG

CLEARCORRECT OPERATING LLC,
CLEARCORRECT HOLDINGS, INC.,
INSTITUTE STRAUMANN AG, &
STRAUMANN USA, LLC,

Defendants.

CLEARCORRECT OPERATING LLC,
CLEARCORRECT HOLDINGS, INC. &
STRAUMANN USA, LLC,

Counterclaim-Plaintiffs
v.

ALIGN TECHNOLOGY INC.,

Counterclaim-Defendant

OPENING EXPERT REPORT OF DR. KARAN SHER SINGH ON INFRINGEMENT OF
U.S. PATENT NOS. 8,038,444 AND 10,791,936

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I. INTRODUCTION

1. I have been retained by Plaintiff Align Technology, Inc. (“Align”) to provide my opinions in the above-captioned case. I understand that Align has alleged that Defendants ClearCorrect Operating LLC, ClearCorrect Holdings, Inc., Institute Straumann AG, and Straumann USA, LLC (collectively, “Straumann”) have infringed various patents assigned to Align. Specifically, I have been asked to investigate and provide opinions as to whether Straumann (1) has infringed United States Patent No. 8,038,444 (the “’444 Patent”) through the use of its Stage treatment planning software and through its importation and sales in the United States of clear aligners made from treatment plans generated by Stage; and (2) has infringed United States Patent No. 10,791,936 (the “’936 Patent”) through the importation and sales in the United States of its Virtuo Vivo and Sirios scanners. I understand that the asserted claims are claims 1-2, 5-6, 11-12, 14, and 39-40 of the ’444 Patent, and claims 1, 4-6, 8-12, and 17 of the ’936 Patent. My opinions regarding Straumann’s infringement of the ’444 and ’936 patents are set forth in this Report.

2. I have also been asked to analyze Align’s TREAT software, including technical documentation and deposition testimony, and to provide my opinion on whether TREAT practices the asserted claims of the ’444 patent. My opinions concerning Align’s practice of the asserted claims of the ’444 patent are stated in this Report.

3. I am submitting this Report in compliance with Federal Rule of Civil Procedure 26(a)(2). I reserve the right to supplement or amend this Report pursuant to Rule 26(e) and as otherwise provided if additional data or other information becomes available. I also reserve the right to respond to any assertions raised in Straumann’s expert reports. I expect to testify at trial regarding the opinions expressed in this Report and any supplemental reports that I may prepare

for this litigation. I also may prepare and rely on audiovisual aids to demonstrate various aspects of my testimony at trial. I also expect to address opinions offered by any expert testifying on behalf of Straumann with respect to the '444 and '936 Patents.

4. In this report, I provide my opinions regarding the field of art and the level of ordinary skill in the art of the '444 and '936 Patents. I also analyze various products, datasheets, schematics, publications, patents, and other materials. Further, I provide my opinion as to how a person of ordinary skill would understand the disclosures of each of the patents.

5. I am being compensated for my work in connection with this matter at my current standard consulting rate of \$700 per hour. I am also being reimbursed for any out-of-pocket expenses. My compensation is not based in any way on the outcome of the litigation or the nature of the opinions that I express and I have no financial interest in the case.

II. EXPERIENCE AND QUALIFICATIONS

6. I have provided a brief summary of my experience and qualifications below. A copy of my most recent curriculum vitae is attached as Exhibit A. A list of my prior expert witness testimony is included in my curriculum vitae.

7. I am an expert in the field of computer graphics and human computer interaction, including the areas of 3D scanning and digital processing of physical objects, and interactive 3D graphics techniques for medical applications at issue in this case. I am currently a Professor of Computer Science at the University of Toronto in Canada, where I co-direct a globally reputed graphics and human computer interaction lab, DGP, and supervise graduate and post-doctoral students. My research, in general, combines graphics, human computer interaction and artificial intelligence for the development of tools for modeling, animation, and visualization.

8. I hold several Computer Science and Engineering degrees. I received a Bachelor of Technology degree in Computer Science from the Indian Institute of Technology in 1991. I earned a Master of Science and a Ph.D. in Computer and Information Science from Ohio State University in 1992 and 1995, respectively. My doctoral research focused on realistic human figure synthesis and animation for virtual reality applications, including the scanning, modeling and animation of three-dimensional digital representations of human figures. I can read and program fluently in various computer programming languages, including C, C#, C++, Pascal, and Java.

9. My professional career over more than three decades has spanned several roles. After completing my doctoral studies, I worked as a graphics researcher at Alias | wavefront Inc. in Toronto, where I contributed to the development of Maya, a widely used commercial software platform for three-dimensional modeling, animation, and rendering. My work on Maya contributed to the software receiving a Technical Achievement Award from the Academy of Motion Picture Arts and Sciences in 2003. I later served as Technical Lead at Paraform Inc. in California, where I worked on technologies for the creation of digital representations of physical 3D objects: including techniques for 3D scanning, clean-up, repair, and further processing of 3D scanned digital geometry for various downstream applications.

10. In addition to my academic appointment at the University of Toronto since 2002, I have extensive experience in applied research and technology commercialization. I have co-founded multiple technology companies focused on computer graphics, interactive modeling, and visualization, including Sketch2 (later acquired by MRI Software), JanusVR, FlatFab, conceptualiz, and JALI Research. My work in these companies was focused on the design and

implementation of interactive graphics tools, user interfaces, and computational techniques for three-dimensional digital modeling, animation, visualization, and fabrication.

11. My work has been recognized through multiple professional honors, including the University of Toronto President's Impact Award, the Canadian Human-Computer Communications Society Lifetime Achievement Award, and the IIT Madras Distinguished Alumni Award. I have served as a visiting professor and invited researcher at academic and industrial research institutions worldwide and have delivered numerous keynote lectures and invited talks on computer graphics, modeling, and animation technologies.

12. I have authored or co-authored more than 150 peer-reviewed publications in leading computer science journals and conferences, including ACM Transactions on Graphics, SIGGRAPH, CHI, and IEEE venues. My research contributions span interactive geometric modeling, sketch-based interfaces, facial animation, anatomical modeling, and augmented and virtual reality systems. I am also an inventor on numerous U.S. patents relating to computer graphics, geometric modeling, and animation technologies.

13. I am an inventor on several U.S. Patents, including US Patent No. 12,205,224 entitled "Computer graphics interface using visual indicator representing object global volume and/or global volume changes and method therefore", U.S. Patent No. 9,965,843 entitled "Methods and systems for characterizing concept drawings and estimating three-dimensional information therefrom,", and U.S. Patent No. 6,204,860 entitled "Method and apparatus for geometric model deformation using wires."

14. I have testified as an expert in the following cases during the previous four years:

- Align Technology, Inc. v. 3Shape A/S, et al., Case No. 1-17-cv-01647 (D. Del.)
- Align Technology, Inc. v. 3Shape A/S, et al., Case No. 1-18-cv-00886 (D. Del.)

- Align Technology, Inc. v. 3Shape A/S, et al., Case No. 6-20-cv-00979 (W.D. Tex.)
- Maxell, Ltd., v. Samsung Electronics Co., Ltd. et al., Case No. 5-23-cv-00092 (E.D. Tex.)
- Figma, Inc. v. Motiff Pte. Ltd. et al., Case No. 3:24-cv-06507 (N.D. Cal.)

III. SUMMARY OF OPINIONS

15. I understand that Align contends as follows with respect to the '444 Patent and the '936 Patent:

- a. Straumann is infringing and has infringed claims 1, 2, 5-6, 11-12, 14, and 39-40 of the '444 Patent through Straumann's use of its Stage treatment planning software [REDACTED] [REDACTED] to generate treatment plans for clear aligners, and Straumann's importation and sales in the United States of clear aligners made from treatment plans generated by Stage.
- b. Align's TREAT software practices claims 1, 2, 5-6, 11-12, 14, and 39-40 of the '444 Patent through its use of automated staging features to generate treatment plans for clear aligners.
- c. Straumann is infringing and has infringed claims 1, 4-6, 8-12, and 17 of the '936 Patent through its importation, sale, offer for sale, and use of the Dental Wings Virtuo Vivo Intraoral Scanner and its software [REDACTED] [REDACTED] and the Straumann SIRIOS Intraoral Scanners and its software [REDACTED], and has induced users of those scanners to infringe the asserted claims.

16. I was asked by counsel for Align to provide certain opinions regarding the '444 Patent and the '936 Patent. In preparing these opinions, I have considered documents, testimony,

and other information regarding the inventions of the '444 Patent; documents, testimony, and other information regarding the inventions of the '936 Patent; technical documents and testimony concerning Straumann's Stage treatment planning software, Virtuo Vivo Intraoral Scanner, and SIRIOS Intraoral Scanners (collectively, "the Accused Products"); technical documents and testimony concerning Align's TREAT treatment planning software and iTero Intraoral Scanner (collectively, "the patent-practicing products"); my own inspections of the Stage treatment planning software and the TREAT treatment planning software and screenshots and other recordings thereof; and source code for the Accused Products. The full list of materials I considered in preparing this report is attached as Exhibit B.

17. I also had conversations with Align employees, including Sam Blanco, Roman Roschin, and Avi Kopelman, as well as Dr. Maureen Valley, who has been retained as an expert witness for Align in this matter. During my discussion with Sam Blanco, we talked about the way Align's technicians use the TREAT software to select a final position for the patient's teeth, generate a proposed treatment plan, and revise said treatment plan as needed. We also discussed the options of staging patterns presented in the TREAT software and the benefits of automated staging. During my discussion with Roman Roschin, we discussed how the invention of the '444 patent came to be, including the design of the TREAT software and implementation of the automated staging features. During my discussion with Avi Kopelman, we discussed how Mr. Kopelman came up with the idea for the '936 patent and the invention's utility in restorative dentistry. We also discussed the benefits of the patented technology. Lastly, during my discussion with Dr. Maureen Valley, we discussed her analysis of how the Dental Wings Virtuo Vivo and Straumann SIRIOS scanners infringe the '936 patent.

18. In summary, I conclude that:

- a. Straumann infringes the asserted claims of the '444 Patent.
 1. Straumann's Stage software infringes claims 1, 2, 5-6, 11-12, 14, and 39-40 of the '444 Patent.
 2. Straumann infringes the asserted claims of the '444 Patent through its use of the Stage treatment planning software to generate treatment plans for clear aligners, and Straumann's importation and sales in the United States of clear aligners made from treatment plans generated by Stage.
- b. Straumann infringes the asserted claims of the '936 Patent.
 1. Straumann's Virtuo Vivo Intraoral Scanner infringes claims 1, 4-6, 8-12, and 17 of the '936 Patent.
 2. Straumann's SIRIOS Intraoral Scanner infringes claims 1, 4-6, 8-12, and 17 of the '936 Patent.
- c. A person of ordinary skill in the art ("POSITA") as of the effective filing date of the '444 Patent would have been part of an interdisciplinary team. This team would have included (1) at least one member with a university degree in computer engineering, computer science, or a related field and at least two years of software development experience; and optionally (2) at least one member with a university degree related to dentistry (e.g., DDS, DMD) with at least two years of work experience in orthodontics.
- d. A person of ordinary skill in the art ("POSITA") as of the effective filing date of the '936 Patent would have been part of an interdisciplinary team. This team would have included (1) at least one member with a university degree in

computer, electrical, or mechanical engineering, or a related field, and at least two years of work experience in software development or 3D imaging of physical structures; and optionally (2) a member with a university degree related to dentistry (e.g., DDS, DMD) with at least two years of experience in dentistry or orthodontics.

IV. TECHNICAL BACKGROUND

A. OVERVIEW OF DENTAL PROCEDURES

19. I have reviewed Dr. Valley's overview of dental procedures and the evolution of modern-day orthodontics and incorporate her discussion by reference. Valley Op. Rpt. at Section VI.A.

B. OVERVIEW OF DENTAL IMAGING AND TREATMENT PLANNING FOR CLEAR ALIGNERS

20. I have reviewed Dr. Valley's overview of dental imaging options and her overview of treatment planning for clear aligners, including her description of Align's Invisalign system and incorporate her discussion by reference. Valley Op. Rpt. at Sections VI.C and VI.D.

V. THE ASSERTED PATENTS

A. '444 Patent

21. The '444 Patent is directed to methods and systems for automating the staging of teeth movement in a treatment plan.¹ The '444 Patent covers a computing device receiving electronic representations of the patient's teeth in their initial and final positions and determining an order of movement of the teeth from initial to final positions using one or more movement patterns, including staggering or round-tripping of teeth, such that the teeth avoid colliding with

¹ '444 Patent at Abstract.

or obstructing each other.² The '444 Patent is generally related to the field of orthodontics.³ The patent is entitled “Automated Treatment Staging for Teeth” and the named inventors are Ian Kitching, Alexander Dmitriev, and Alexey Vishnevskiy. The '444 Patent claims priority to U.S. Provisional Application Nos. 60/824,022 and 60/824,024, both filed on August 30, 2006.

22. The inventors recognized that in prior systems for designing clear removable aligners, it was often necessary to manually manipulate digital models of a patient’s teeth to plan movements through the treatment stages.⁴ This was a laborious and time-consuming process and required extensive training for the technicians, as every patient’s teeth were unique and their movements during treatment were also unique.⁵ The inventors recognized that although some aspects of the planning and manufacturing processes had been automated, one continuing technical challenge was to automate the staging process to reduce the time and effort necessary to create treatment plans.⁶ By automating the staging of the treatment plans, technicians could prepare complex treatment plans with greater consistency, efficiency, and speed, ultimately reducing the amount of time to deliver clear aligners to the patient. [REDACTED]

[REDACTED]

1. Specification of the '444 Patent

23. The specification of the '444 Patent describes several exemplary embodiments of methods for using a computer device to automatically stage the movement of teeth in a treatment plan. For example, a computing device can receive an electronic representation of the patient’s teeth in an initial position taken by an intraoral scanner or based on an impression of a patient’s

² '444 Patent at Abstract.

³ '444 Patent at 1:16-19.

⁴ '444 Patent at 1:45-50.

⁵ '444 Patent at 1:50-63.

⁶ '444 Patent at 1:64-2:2.

teeth. '444 patent at 5:11-16. The computing device can also receive or generate an electronic representation of a desired final position for each of the patient's teeth. '444 patent at 5:16-19.

24. The computing device can be configured to allow a system user to assess the initial and desired final positions of a patient's teeth, and then select an appropriate movement pattern. '444 patent at 6:4-12. Alternatively, the computing device can be configured to automatically determine and select a pattern for treatment. '444 patent at 6:15-19.

25. The system user can determine and/or the computing device can be configured to automatically determine if the movement pattern should be modified to avoid collision. '444 patent at 6:27-31. In one embodiment, the computer program is configured to "stagger," "round trip," and/or slow the movement of one or more teeth if the patient's teeth cannot be moved without colliding with and/or obstructing each other. '444 patent at 6:39-43. The computer program determines the most efficient path to take through some combination of patterns and accommodation of movement thereof. '444 patent at 6:43-46.

26. Figures 1A, 1B, and 1C of the '444 Patent represent diagrams showing the arrangement of a patient's teeth at an initial stage (1A), an intermediate stage (1B), and a final stage (1C), respectively, of orthodontic treatment.

27. Figure 1D is a diagram showing teeth numbering according to the standard system of tooth numbering.

28. Figure 2A is a diagram illustrating a partial model of a patient's dentition, including a model of gingival tissue.

29. Figure 2B is a flow diagram illustrating a plurality of patterns and options available to a computing device for optimizing the movement of a patient's teeth during treatment.

30. Figures 6A and 6B are diagrams of exemplary embodiments of a “Mid-Line Shift” pattern for moving the skewed teeth of a patient during an orthodontic treatment.

31. Figure 8 is a diagram of an exemplary embodiment using a staggering technique to avoid collisions with and/or obstructions between teeth during the orthodontic treatment.

32. Figure 10B is a diagram of an exemplary embodiment utilizing different rates of movement to avoid collisions with and/or obstructions between teeth during the orthodontic treatment.

2. Prosecution History of the '444 Patent

33. U.S. Patent No. 8,038,444 claims priority to U.S. Provisional Application No. 60/824,022, filed on August 30, 2006, and U.S. Provisional Application No. 60/824,024, filed on August 30, 2006.

34. The '022 Application was filed with 39 claims directed to systems and methods for staging a path of movement for correcting the position of one or more teeth.

35. The '024 Application was filed with 42 claims directed to systems and methods for staging a path of movement for correcting the position of one or more teeth.

36. U.S. Patent Application 11/848,172 was filed on August 30, 2007, which issued as the '444 Patent on October 18, 2011.

37. On June 10, 2011, the USPTO issued a Notice of Allowance on U.S. Patent Application No. 11/848,172. The USPTO cited to, amongst others, Chishti '876 and Chishti '511 as prior art references considered during the prosecution.

38. On August 12, 2011, the patentee submitted an amendment after Notice of Allowance to correct a typographical error in Claim 1. The amendment was entered on August 22, 2011.

39. ClearCorrect petitioned for *inter partes* review of the '444 patent on July 20, 2017. In particular, ClearCorrect argued that the claim terms “staging the movement of a plurality of dental objects,” “staggering,” “roundtripping,” “through at least one of staggering and round-tripping of at least one dental object,” and “means for” were indefinite. ClearCorrect also argued that Chishti '876 (U.S. Patent No. 6,729,876) and Chishti '511 (U.S. Patent No. 6,471,511) were prior art references that rendered the '444 patent unpatentable.

40. The USPTO denied institution of *inter partes* review on the '444 patent on February 5, 2018. *Align v. ClearCorrect*, IPR2017-01829 (P.T.A.B. February 5, 2018) (Paper 10). On claim construction, the Board found that ClearCorrect had failed to properly construe the means-plus-function terms in challenged claims 1-28 and denied institution on those grounds. The Board applied the explicit definitions in the '444 patent for “staggering” and “roundtripping” and found it unnecessary to construe any other claim term.

41. On the prior art references, the Board found that Chishti '876 taught away from the “roundtripping” technique claimed in the '444 patent and failed to disclose a requirement of staggering as defined by the '444 patent. Similarly, the Board found that Chishti '511 taught a different type of “roundtripping” than described in the '444 patent.

3. Asserted Claims of the '444 Patent

42. Below, I have reproduced asserted independent claim 1 of the '444 Patent:

1. A computer-implemented method for staging the movement of a plurality of dental objects, the method comprising:

receiving, at a host computer, an electronic representation of each dental object of the plurality of dental objects in relation to one another;

receiving, by the host computer, an electronic representation of a desired final position for each respective dental object; and

determining, by the host computer, an order of movement for each respective dental object such that the dental objects avoid colliding with or obstructing each other on their respective routes from said initial position to said desired final position through at least one of staggering and round-tripping of at least one dental object.

43. Asserted dependent claim 2 requires all the elements of claim 1 and further specifies that determining the order of movement comprises: (a) determining a route each respective dental object will move to achieve its respective final position; (b) determining the distance each respective dental object will move to achieve its respective final position; and (c) determining a rate at which each respective dental object will move along its respective route.

44. Asserted dependent claim 5 requires all the elements of claim 1 and further requires determining, by the host computer, an optimal number of stages for the order of movement of the dental objects.

45. Asserted dependent claim 6 requires all the elements of claim 5 and further specifies that determining the optimal number of stages comprises determining a total distance each respective dental object will move; dividing the total distance for each dental object by its respective maximum speed to determine a number of movement stages for each dental object; determining a number of non-movement stages for each respective dental object; adding the number of movement stages to the number of non-movement stages for each dental object to determine the minimum number of stages for each respective dental object; and selecting the largest of the minimum number of stages.

46. Asserted dependent claim 11 requires all the elements of claim 1 and further specifies that determining the order of movement step comprises ordering the movement of the dental objects to form a mid-line shift pattern.

47. Asserted dependent claim 12 requires all the elements of claim 1 and further specifies that determining the order of movement step comprises staggering the movement of at least two dental objects.

48. Asserted dependent claim 14 requires all the elements of claim 1 and further specifies that determining the order of movement step comprises slowing the movement of at least one dental object.

49. Below, I have reproduced independent claim 29 of the '444 Patent:

29. A machine-readable medium having stored thereon a plurality of instructions for staging the movement of a plurality of dental objects, the plurality of instructions when executed by a processor, causing the processor to:

receive an electronic representation of each dental object in relation to one another in an initial position;

receive an electronic representation of a desired final position for each respective dental object; and

determine an order of movement for each respective dental object such that the dental objects avoid colliding with each other on their respective routes from said initial position to said desired final position.

50. Asserted dependent claim 39 requires all of the elements of claim 29 and further specifies that the instructions further comprise instructions to order the movement of the dental objects in a mid-line shift pattern.

51. Asserted dependent claim 40 requires all of the elements of claim 29 and further specifies that the instructions further comprise instructions to stagger the movement of at least two dental objects.

B. '936 Patent

52. The '936 Patent is directed to methods and systems for scanning a patient's teeth in connection with preparation of orthodontics and prosthodontics.⁷ The patent is entitled "Methods and Systems for Creating and Interacting with Three Dimensional Virtual Models," and was issued on October 6, 2020. The sole named inventor of the '936 Patent is Avi Kopelman. The '936 Patent claims priority to U.S. Provisional Application No. 61/365,556, filed on July 19, 2010.

53. I have reviewed Dr. Valley's summary of the '936 Patent and I incorporate it by reference. Valley Op. Rpt. at Section VII.A.

[REDACTED]

[REDACTED]

[REDACTED]

1. Specification of the '936 Patent

55. The specification of the '936 Patent describes ways in which a virtual model of the intra-oral cavity can be useful to the dental practitioner. The '936 Patent describes the "model" in broad terms that include "3D virtual model," "digital model," "3D numerical entity," "computer model," "3D digitized data," and "3D representation." *See* '936 patent at col. 3:26-37.

56. The specification of the '936 Patent describes several embodiments of the invention. In Embodiment A, a user may "correct" a portion of a virtual model of the teeth by rescanning a portion of the model. '936 patent at col. 14: 45-15:36. First, a first 3D virtual model of a physical part is created using a scanner. The virtual model is displayed to the user, so that the user may check the model. A portion of the first model is deleted or otherwise removed,

⁷ '936 Patent at Abstract, 1:20-22.

resulting in a modified first virtual model. A second virtual model representing the previously deleted portion is created using a scanner. The second virtual model is then manipulated in the computer stem to register it onto the modified first virtual model. Identifying surface data from the second virtual model may be useful to align with corresponding parts of the modified first virtual model. In this aligned position, the second virtual model can be stitched into the modified first virtual model. The remainder of the second virtual model, including the identifying information may be discarded.

57. Embodiment B describes a way for a user to obtain a virtual model of the intra-oral cavity, even with an artifact obscuring some of the initial scan. '936 patent at 15:37-16:14. A user need only delete the portion that is a removable artifact, which may be temporarily obscuring part of the dental services, such as a scan body or impression abutment, from the first virtual model.

58. Embodiment C describes a use in orthodontics, such as the preparation of a crown or bridge. '936 patent at 16:15-17:12. In this scenario, a user may be preparing a dental preparation and checking that it is suitable for its intended use, and can continue modifying the dental preparation until it is deemed suitable for its intended use. The dental practitioner can then rescan the area including the removed/modified teeth and replace the parts of the original virtual model corresponding to these teeth.

59. Figure 1 of the '936 patent shows, by way of a flow chart, a method in accordance with a first embodiment of the invention.

60. Figure 2 shows various elements of a system used for providing and manipulating a virtual dental model according to the embodiment of Figure 1.

61. Figure 3 is a schematic illustration of providing a first virtual model to the computer system of Figure 2 and interacting with the display.

62. Figure 4 is a schematic illustration of a modified first computer model as displayed by the computer system

63. Figure 5 is a schematic illustration of providing a second virtual model to a computer system of Figure 2.

64. Figure 6 is a schematic illustration of registering the second virtual model of Figure 5 with the modified computer model of Figure 4.

65. Figure 7 is a schematic illustration of using a physical part with the second embodiment of the invention.

66. Figure 8 is a schematic illustration of using a physical part with the third embodiment of the invention.

67. Figure 9 is a flow chart showing a method in accordance with an alternative variation on the first embodiment of the invention.

2. Prosecution History of the '936 Patent

68. U.S. Patent No. 10,791,936 issued from U.S. Application No. 16/586,528 (the "'528 Application"), which is a continuation of U.S. Application No. 13/574,723, filed as International Application No. PCT/IL2011/000574 on July 19, 2011, now U.S. Patent No. 9,299,192. The '936 Patent claims priority to U.S. Provisional Application No. 61/365,556 filed on July 19, 2010.

69. The '528 Application was filed on September 27, 2019, with 20 claims directed to systems and methods for scanning a patient's teeth.

70. On January 23, 2020, the '528 Application was published as US2020/0022584A1.

71. On February 21, 2020, the USPTO issued a non-final rejection of the pending claims. Claims 1-20 were provisionally rejected on the ground of non-statutory double patenting as being unpatentable over claims 1-8 and 23-30 of co-pending Application No. 16/174,474. The Examiner indicated that the subject matter was allowable.

72. On March 19, 2020, Applicants amended the claims and filed a terminal disclaimer over U.S. Application No. 16/176,474.

73. The USPTO issued a Notice of Allowance on April 8, 2020. The Examiner noted that the claims distinguish over the prior art because they recite updating scans in scenarios where the intraoral cavity is modified between scans (e.g., subjected to a surface preparation). According to the Examiner, the prior art only described recapturing scans of a static intra-oral region and taught away from generating a composite scan after intraoral modifications are made. The Examiner also concluded that the claims recited eligible subject matter under 35 USC § 101.

3. Asserted Claims of the '936 Patent

74. Below, I have reproduced asserted independent claim 1 of the '936 Patent.

1. A system for scanning a patient's teeth for a dental procedure, the system comprising:

A hand-held intraoral scanner, and

a computer readable medium including instructions that when executed by a computer system, cause the computer system to:

receive first scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receive user input defining a portion of the model to be removed;

remove, from the displayed model, a removed surface portion of the model to be removed according to the user input;

receive second scan data of the patient's teeth from the hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intraoral cavity;

replace at least a portion of the removed surface portion of the model using the received second scan of the patient's teeth including surface data of a physically changed portion of the patient's intraoral cavity; and

output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received second scan data.

75. Asserted dependent claim 4 requires all of the elements of claim 1 and further requires that the claimed instructions comprise instructions to register the received second scan data with the model.

76. Asserted dependent claim 5 requires all of the elements of claim 4 and further specifies that the claimed received second scan data is registered with the model by aligning identifying data of the received second scan data with corresponding parts of the model.

77. Asserted dependent claim 6 requires all of the elements of claim 5 and further specifies that the claimed instructions further comprise instructions to further stitch a portion of the received second scan data with the model.

78. Asserted dependent claim 8 requires all of the elements of claim 1 and further requires that the claimed instructions cause the computer system to mark, on the displayed model, the user input defined portion, after receiving the user input and before removing the removed surface portion of the model.

79. Below, I have reproduced asserted independent claim 9:

9. A method for scanning a patient's teeth for a dental procedure, the method comprising:

receiving first scan data of the patient's teeth from a hand-held intraoral scanner;

displaying, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receiving user input via the displayed model demarcating a portion of the model to be retained and a surface portion of the model to be replaced;

receiving second scan data of the patient's teeth from a hand-held intraoral scanner, the second scan data including surface data of a physically changed portion of the patient's intraoral cavity;

replacing at least a portion of the surface portion of the model to be replaced according to the user input using at least a portion of the second scan data of the patient's teeth including the physically changed portion; and

outputting, to the display, the model of the patient's teeth with the at least the portion of the surface portion replaced using the second scan data.

80. Asserted dependent claim 10 requires all of the elements of claim 9 and further requires that the claimed method comprises marking an area on the displayed model associated with the received user input.

81. Asserted dependent claim 11 requires all of the elements of claim 9 and further specifies that the claimed "replacing" step of the method comprises registering the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model.

82. Asserted dependent claim 12 requires all of the elements of claim 11 and further requires that the claimed "replacing" step of the method comprises stitching the portion of the second scan data with the model.

83. Below, I have reproduced asserted independent claim 17:

17. A system for intraorally scanning a patient's teeth for a dental procedure, the system comprising:

a hand-held intraoral scanner; and

a computer readable medium including instructions that when executed by a computer system, cause the computer system to:

receive first scan data of the patient's teeth from the hand-held intraoral scanner;

display, to a display, a model of the patient's teeth, wherein the model of the patient's teeth is based on the received first scan data of the patient's teeth;

receive user input defining a portion of the model to be removed;

after receiving the user input, remove, from the displayed model, a removed surface portion of the model to be removed according to the user input;

after removing the portion of the model, receive second scan data of the patient's teeth from the hand-held intraoral scanner;

register the second scan data with the model by aligning identifying data of the second scan data with corresponding parts of the model;

replace at least a portion of the removed surface portion of the model using at least a portion of the received second scan data of the patient's teeth;

discarding a remainder of the second scan data, including the identifying data, after registering the second scan data with the model; and

output, to the display, the model of the patient's teeth with the portion of the removed surface portion replaced using the received second scan data.

VI. SUMMARY OF THE ACCUSED PRODUCTS

A. CLEARCORRECT SYSTEM

84. Straumann markets the ClearCorrect System as a clear aligner solution comprising software designed for use by doctors and technicians. The ClearCorrect System includes the ClearPilot, [REDACTED] and Stage softwares.

1. ClearPilot Software

85. Straumann's ClearPilot software is a web-based treatment planning tool designed for use by doctors. ALGN00014994. ClearPilot provides a 3D simulation of the treatment using the physician's prescription, instructions, and patient records. *Id.* Specifically, physicians submit the desired final position of the patient's teeth and the instructions related to the desired changes, and the technician will then adjust the setup to reflect the requested edits. *Id.* The tool presents a sequential 3D animation illustrating the movement of the teeth, which allow physicians and end users to visualize treatment plans and goals. *Id.* All features of ClearPilot are accessible via the Doctor Portal and via Straumann's eShop website. *Id.* ClearPilot is able to animate and display treatment plans containing the staggering and midline shift patterns. ALGN00014993.

2. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

3. Stage Software

[REDACTED]

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B. Straumann Intraoral Scanners

89. I have reviewed Dr. Valley's expert opinions regarding the Straumann Intraoral Scanners and I hereby incorporate her discussion by reference. Valley Op. Rpt. at Sections X.A.-B.

90. Straumann sells or has sold two lines of intraoral scanners: the Dental Wings Virtuo Vivo scanner and the Straumann SIRIOS scanners. All the scanners are intraoral scanners used to take scans of a patient's teeth for a dental procedure, including in the manufacture of clear aligners and in preparation for restorative dentistry. When used in conjunction with the manufacture of clear aligners, the Straumann Intraoral Scanners export the scan data as STL files for use in the ClearCorrect System.

91. In 2017, Straumann acquired Dental Wings, a digital dentistry company based in Montreal, Canada. 2025-12-23 CC 5th Suppl R&O to Rog No. 2 at p 222. At the time, Dental

Wings was selling its first intraoral scanner, the DWIO scanner. *Id.* After the acquisition by Straumann, Dental Wings began developing the Virtuo Vivo intraoral scanner, which it launched in 2019. *Id.*; Marbach Dep. Tr. 40:13-41:20, Straumann discontinued the Virtuo Vivo scanner in late 2024. Marbach Dep. Tr. 41:24-42:3.

■ [REDACTED]

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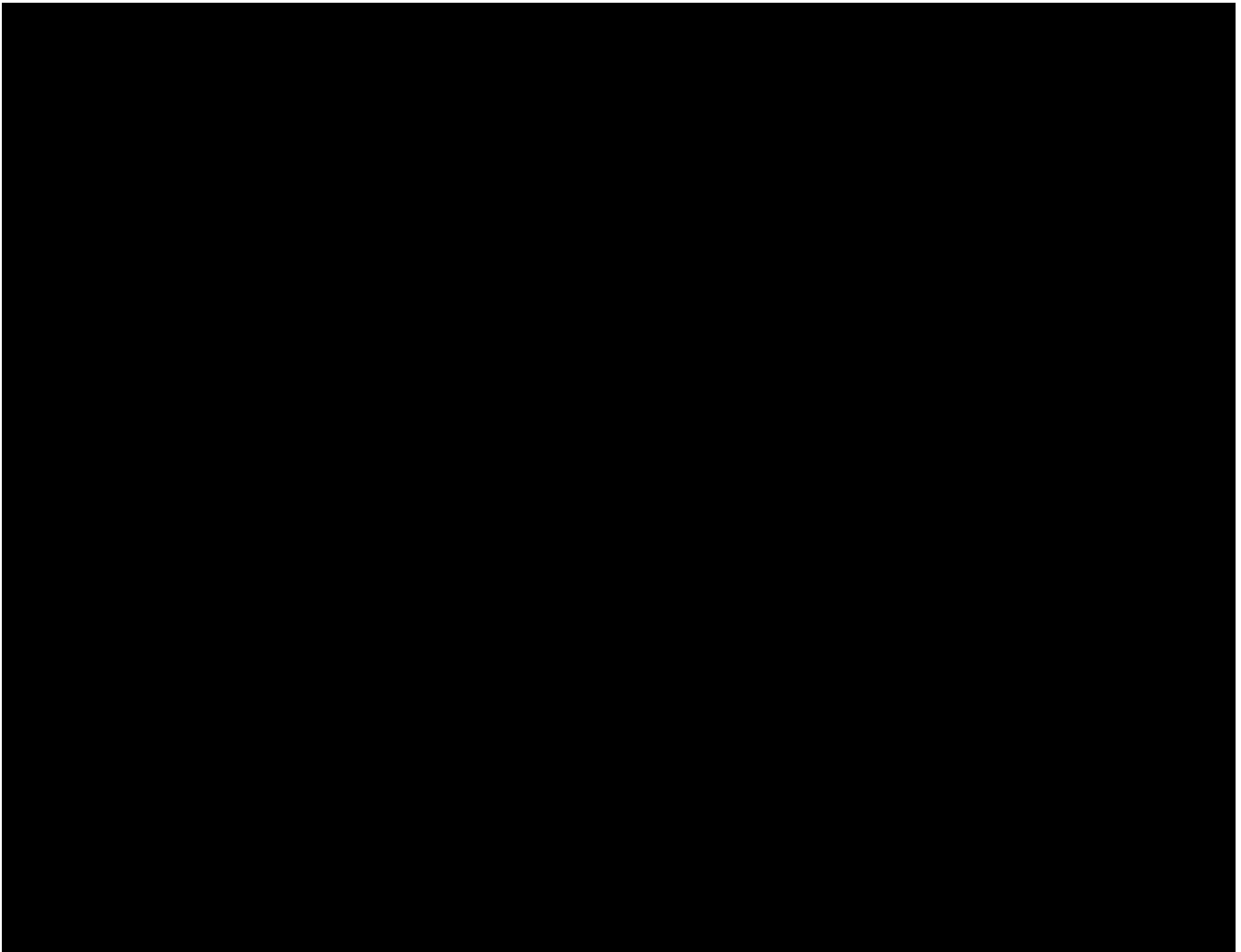
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94. In 2024, Straumann acquired a major stake in AlliedStar, a manufacturer of intraoral scanners based in China. [REDACTED]

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VII. LEGAL STANDARD

98. I understand that the following legal standards apply to matters that I address herein from a technical perspective.

99. I am not a legal expert and offer no legal opinions in this report.

A. INFRINGEMENT

1. Direct Infringement

100. I understand that for accused infringer to directly infringe, the accused infringer must make, use, offer to sell, or sell within the United States, or import into the United States the patented invention.

101. I understand that in order to prove direct infringement, the accused product, system, or method must meet each and every limitation of at least one asserted patent claim. If even one claim limitation is missing, there is no direct infringement of that claim.

102. I understand that the patentee must show that it is more likely than not that the accused infringer infringes a claim.

103. I understand that a claim can be directly infringed two different ways: (1) literal infringement and (2) infringement under the doctrine of equivalents.

104. I understand that literal infringement occurs when each and every limitation of the asserted claim is found in the accused product or method exactly as claimed. To determine if an accused product or method literally infringes, I understand that the accused product or method must be compared to the claim to determine whether every requirement of the claim is included in the accused product or method. If the accused product or method does not include every requirement of the claim, the accused product or method does not literally infringe the claim.

105. I understand that even if an accused product or method does not literally infringe, it may still infringe under the doctrine of equivalents. I understand that under the doctrine of equivalents, a claim limitation is satisfied if the accused element performs substantially the same function, in substantially the same way, to achieve substantially the same results as the claimed limitation. I understand that the doctrine of equivalents is applied on an element-by-element

basis, not to the invention as a whole, and is subject to legal limitations, such as prosecution history estoppel.

106. I understand that direct infringement for a method claim requires that all of the steps of the claimed method are performed. I also understand that a single entity must perform every step of the method claim, either directly or through attribution. I understand that direct infringement may be found where one party exercises direction or control over others who perform some steps, or where multiple actors operate together as a joint enterprise.

2. Indirect Infringement

107. I understand that an accused infringer can indirectly infringe by (1) inducing infringement under 35 U.S.C. § 271(b) and (2) contributing to infringement under 35 U.S.C. § 271(c).

108. For a finding of induced infringement, I understand that the accused infringer must actively and knowingly induce a third party to infringe a claim. I understand that the patentee must show that the third party directly infringed the patent claim. I understand the patentee must also show that the accused infringer knew of the asserted patent and knew or was willfully blind that the induced acts constituted direct infringement. I understand the patentee must prove that the accused infringer took affirmative steps to encourage, aid, or cause the infringing conduct.

109. I understand that affirmative acts to induce infringement may include providing instructions, technical support, product manuals, training materials, marketing materials, or other communications that encourage or instruction customers or end users to perform the infringing acts.

110. For a finding of contributory infringement, I understand that accused infringer must sell, offer to sell, or import a component of the patented invention. I understand that the

component of the patented invention must constitute a material part of the invention and be especially made or adapted for use in an infringing manner. I understand that the component cannot be a staple article or commodity of commerce suitable for substantial non-infringing uses. I also understand that the accused infringer must have the knowledge that the component is made for use in an infringing product or method. Like inducement, I understand that contributory infringement requires proof of an underlying act of direct infringement.

B. PERSON OF ORDINARY SKILL IN THE ART

111. I am not a lawyer but understand that the law requires that the meaning of terminology and disclosures in a patent are considered from the perspective of a person having ordinary skill in the pertinent art at the time of the alleged invention, which may be assumed to be the effective filing (priority) date on which the patent owner relies. I understand that the effective filing date of the '936 Patent is July 19, 2010 and the effective filing date of the '444 patent is August 30, 2006.

112. I understand that some of the factors that may be considered in determining the level of ordinary skill in the art include (1) educational level and any specialties of the patent applicants; (2) types of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; (6) educational level and any specialties of active workers in the field; and (7) the nature of any testing described in the patent (and skills required of those doing such testing).

113. Based on my experience and reading of the '936 patent, a person of ordinary skill in the art ("POSITA") as of the effective filing date of the '936 Patent would have been part of an interdisciplinary team. This team would have included (1) at least one member with a university degree in computer, electrical, or mechanical engineering, or a related field, and at least two years of work experience in software development or 3D imaging of physical structures; and

optionally (2) a member with a university degree related to dentistry (e.g., DDS, DMD) with at least two years of experience in dentistry or orthodontics.

114. Based on my experience and reading of the '444 patent, a person of ordinary skill in the art ("POSITA") as of the effective filing date of the '444 Patent would have been part of an interdisciplinary team. This team would have included (1) at least one member with a university degree in computer engineering, computer science, or a related field and at least two years of software development experience; and optionally (2) at least one member with a university degree related to dentistry (e.g., DDS, DMD) with at least two years of work experience in orthodontics.

VIII. CLAIM CONSTRUCTION

115. I understand various principles govern how a court determines how a skilled artisan would understand the meaning and scope of patent claims and terminology therein. I understand that some of these principles are as given below.

116. **Intrinsic evidence:** I understand that intrinsic evidence includes the claim language itself, the specification of the patent, and the prosecution history. I understand that the claim language is the starting point for claim construction. I understand that the specification must also be considered when construing the claims. However, I also understand that the specification may describe specific embodiments, and courts avoid importing limitations from preferred embodiments into the claims unless the patentee has clearly expressed an intent to limit the claims in that manner. I understand that prosecution history may also inform claim construction by showing how the patent applicant and the United States Patent and Trademark Office understood the invention, including whether the patent applicant made clear statements limiting the scope of the claims to reach allowance.

117. **Ordinary meaning:** I understand that claims are generally given their ordinary meaning unless the patentee has acted as a lexicographer by explicitly defining a term or has clearly disclaimed or limited the scope of claims during prosecution.

118. **Extrinsic evidence:** I understand that courts may also consider extrinsic evidence, such as expert testimony, technical dictionaries, and treatises, to assist in understanding the meaning of a claim term. Extrinsic evidence may be used to provide context or background but is generally considered less reliable than intrinsic evidence and cannot contradict the clear meaning of the intrinsic evidence.

119. I understand that the Court entered a claim construction order construing the claims of the Asserted Patents on June 5, 2025.⁸ In forming my opinions, I used the Court's construction of the claim terms as summarized below. For terms without a construction from the Court, I interpreted the term as a person of ordinary skill in the art would at the time that each patent was filed in view of the claim language, specification, and prosecution history. Below are the Court's constructions for each patent.

120. **'444 Patent:** I understand that the Court construed "through at least one of staggering and roundtripping of at least one dental object" to be the "[p]lain and ordinary meaning which includes 'by staggering or roundtripping at least one dental object.'"⁹ I understand that the Court construed "an optimal number of stages for the order of movement of the dental objects" to be "[t]he largest number of minimum stages needed to place the patient's

⁸ ECF No. 185 (Claim Construction Order).

⁹ *Id.* at 3.

teeth in their final, desired position.”¹⁰ I understand the Court construed “mid-line shift pattern” to be the plain and ordinary meaning.¹¹

121. **’936 Patent:** I understand that the Court construed “replace [replacing] at least a portion of the [removed] surface portion of the model [. . .] using the received second scan data [at least a portion of the second scan data]” as “[register] / [registering] the [received] second scan data with a retained portion of the model after removing the scan data of the removed surface portion.”¹² I understand the Court construed “second scan data of the patient’s teeth” as the plain and ordinary meaning.¹³

122. I understand the parties agreed to constructions of certain terms of the ’444 Patent, as set forth in the Joint Claim Construction Statement of January 3, 2025.¹⁴ The parties agreed that the term “stagger[ing]” means “[delaying / delay] one or more teeth from moving one or more stages where it would otherwise move in order to prevent another tooth from colliding with and/or obstructing the path of the delayed tooth.” The parties agreed that the term “round trip[ping]” means “[moving / move] a first tooth out of the path of a second tooth, and once the second tooth has moved sufficiently, [moving / move] the first tooth back to its previous position before proceeding to a desired final position of that first tooth.” The parties agreed that the term “slow[ing]” means “[having / have] one or more teeth scheduled to move at a rate less than the rate of other teeth, or even [stopping / stop] using interim key frames, so that collisions and/or obstructions do not occur.”

¹⁰ *Id.*

¹¹ *Id.* at 4-5.

¹² *Id.* at 10.

¹³ *Id.*

¹⁴ ECF No. 142 at 8 (Joint Claim Construction Statement).

IX. ANALYSIS AND OPINIONS

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- Line 1: A short redacted segment at the beginning, followed by a long redacted segment.
- Line 2: A short redacted segment at the beginning, followed by a long redacted segment.
- Line 3: A single long redacted segment.
- Line 4: A single long redacted segment.
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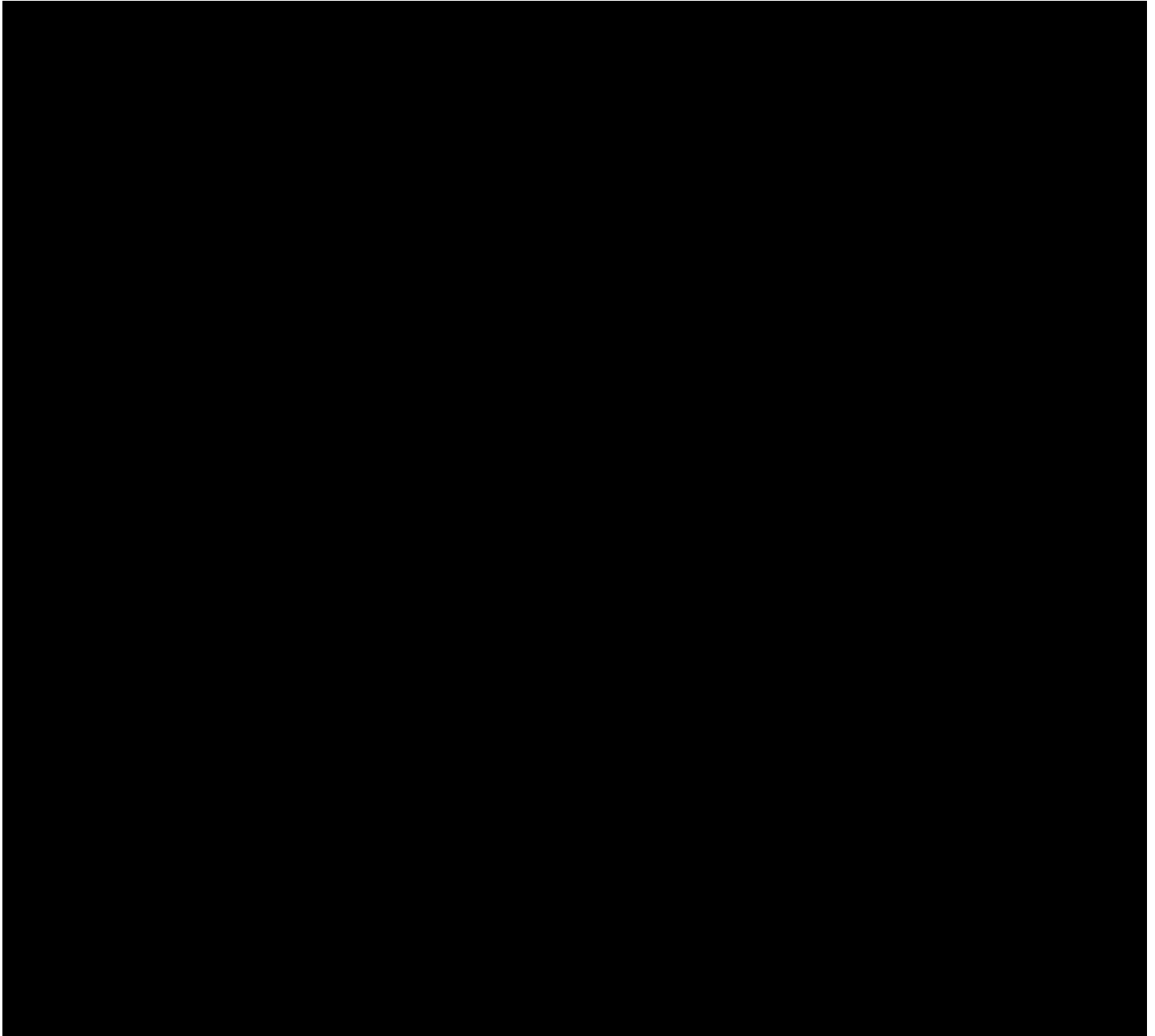
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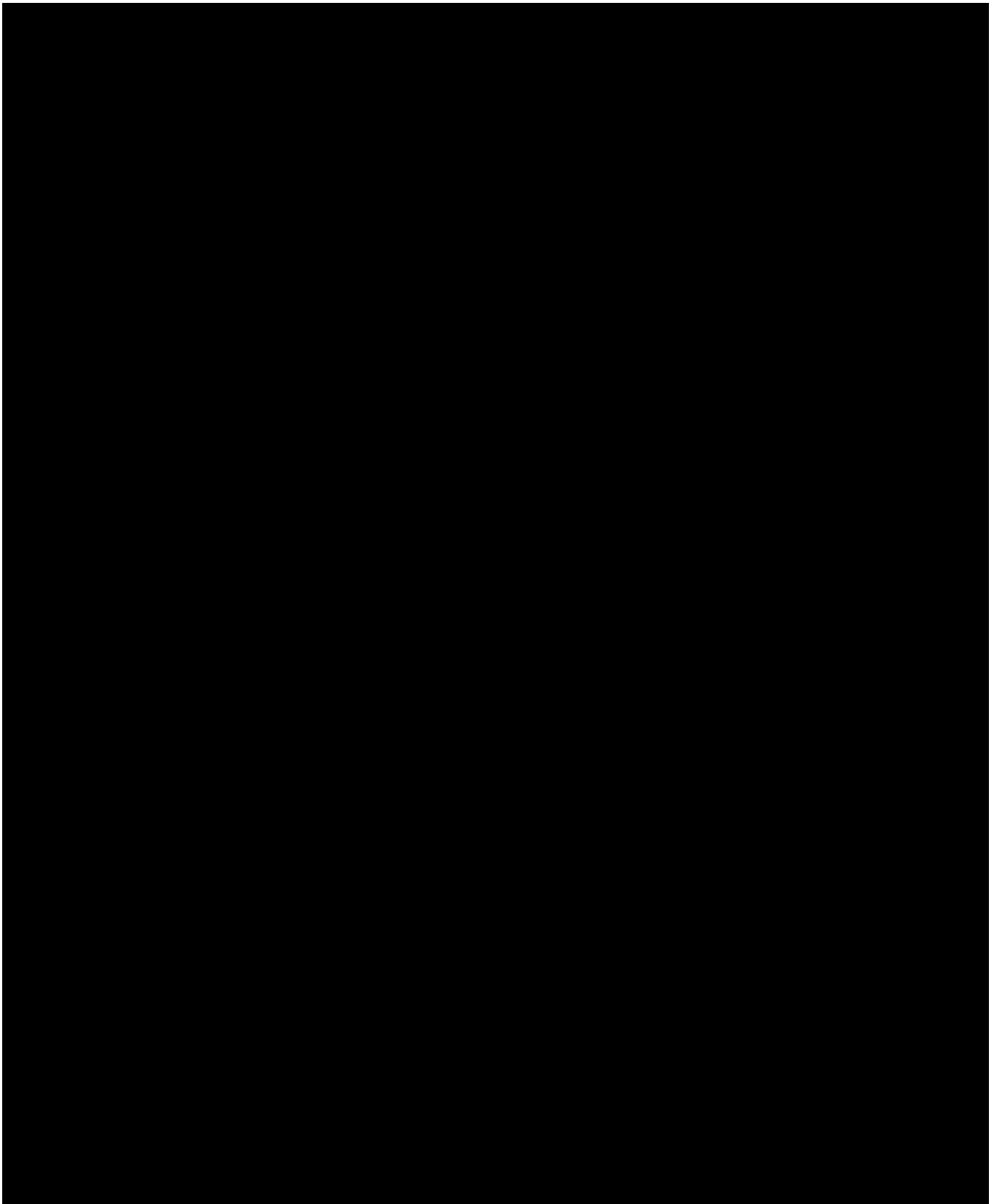
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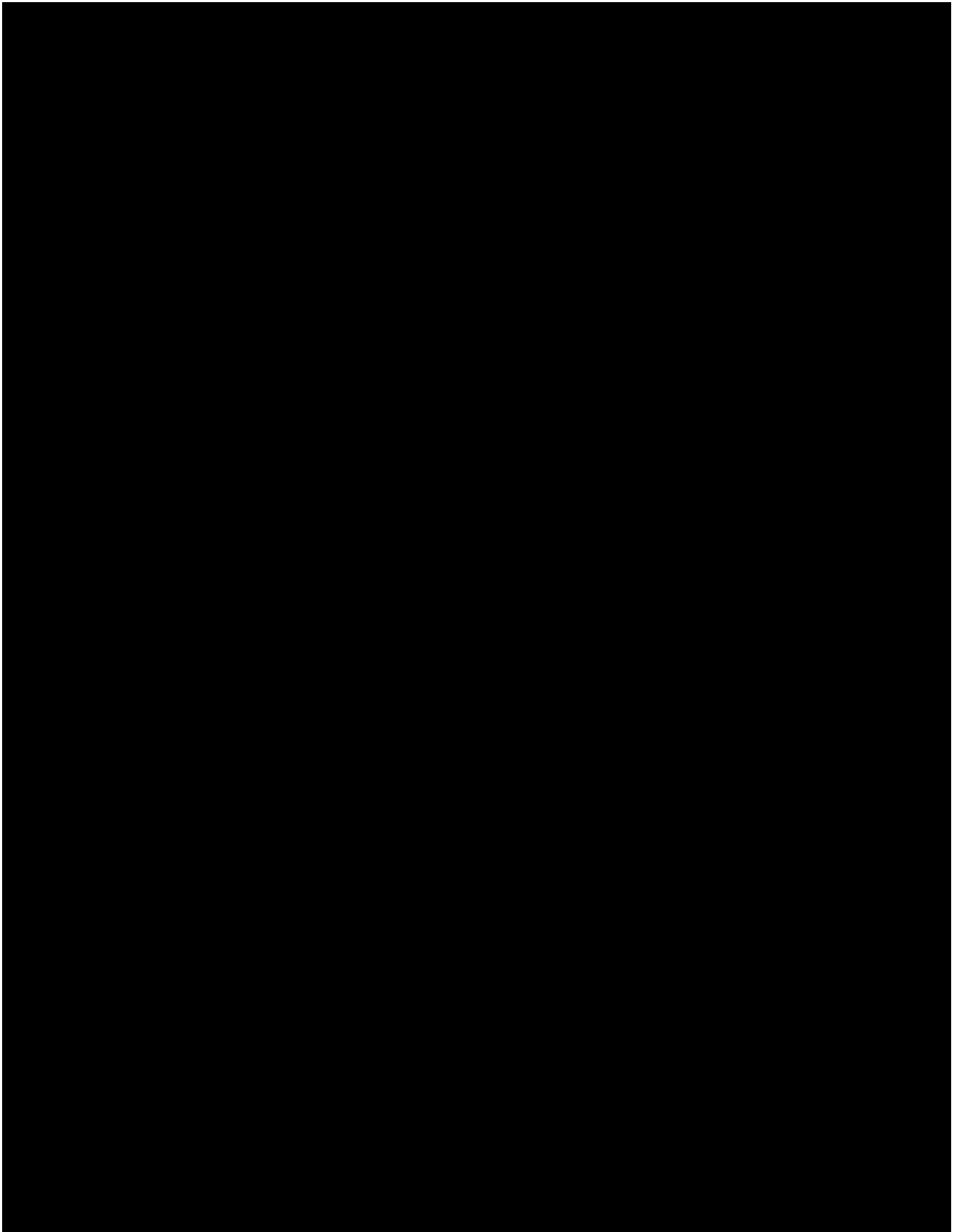
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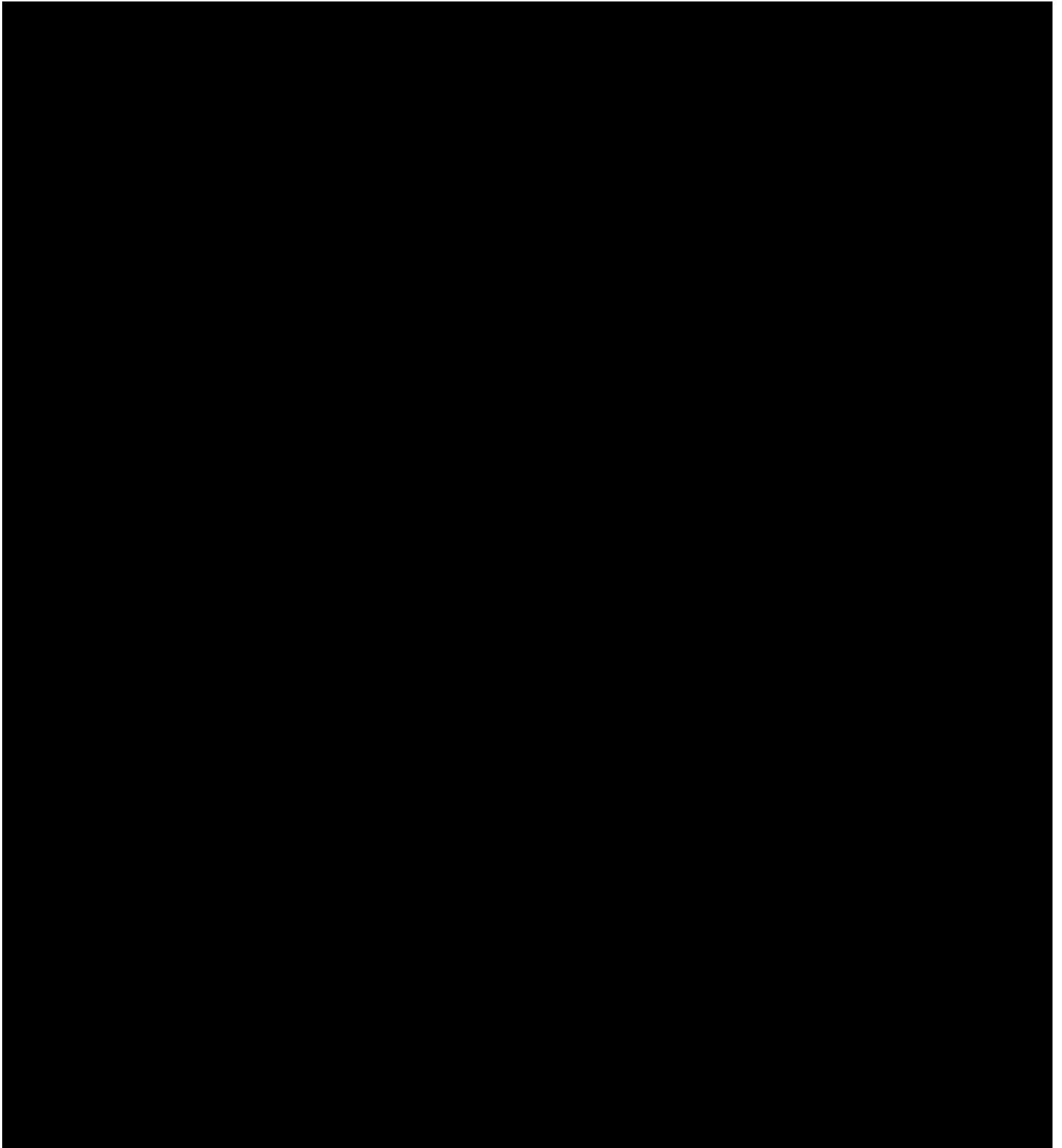
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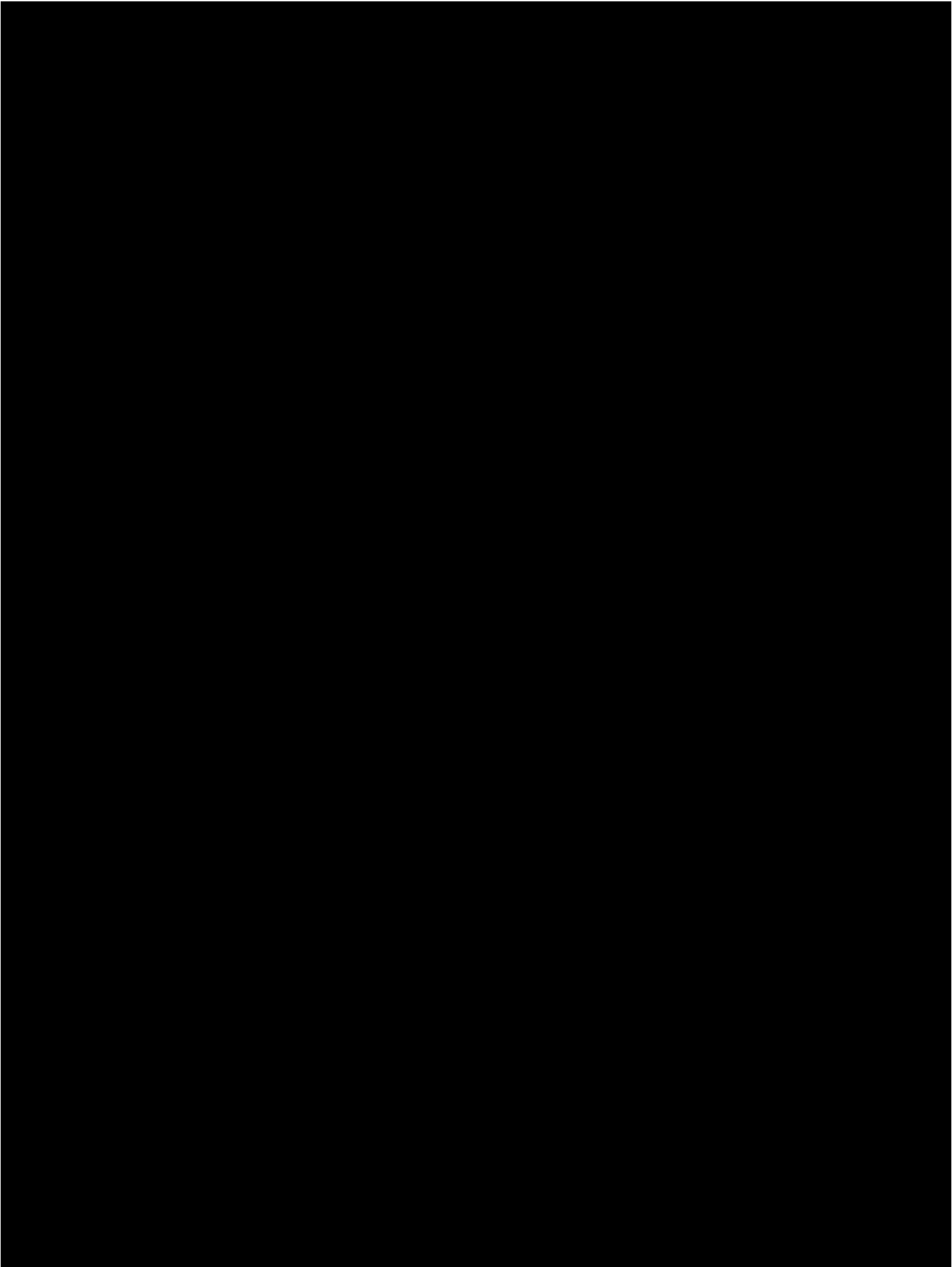
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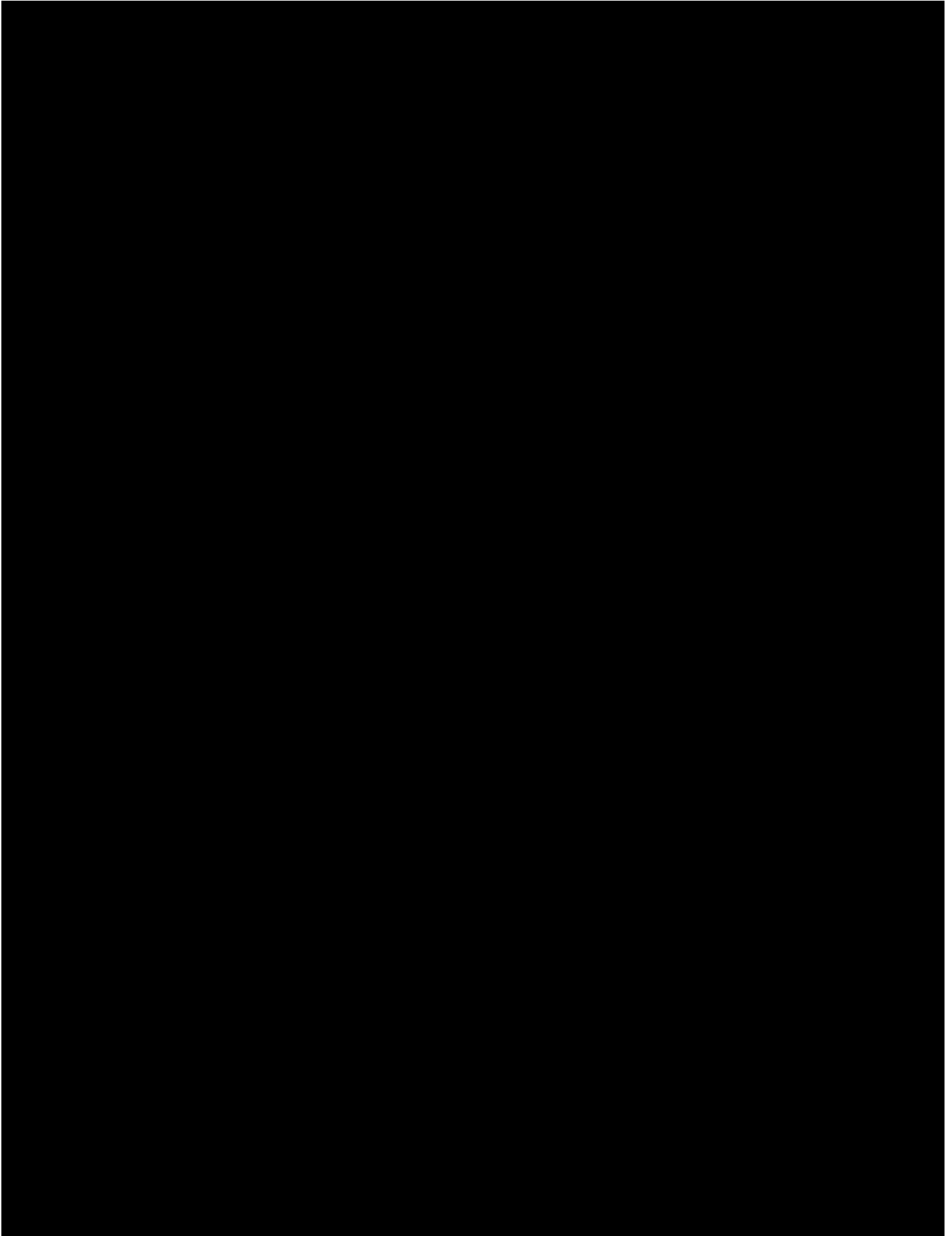






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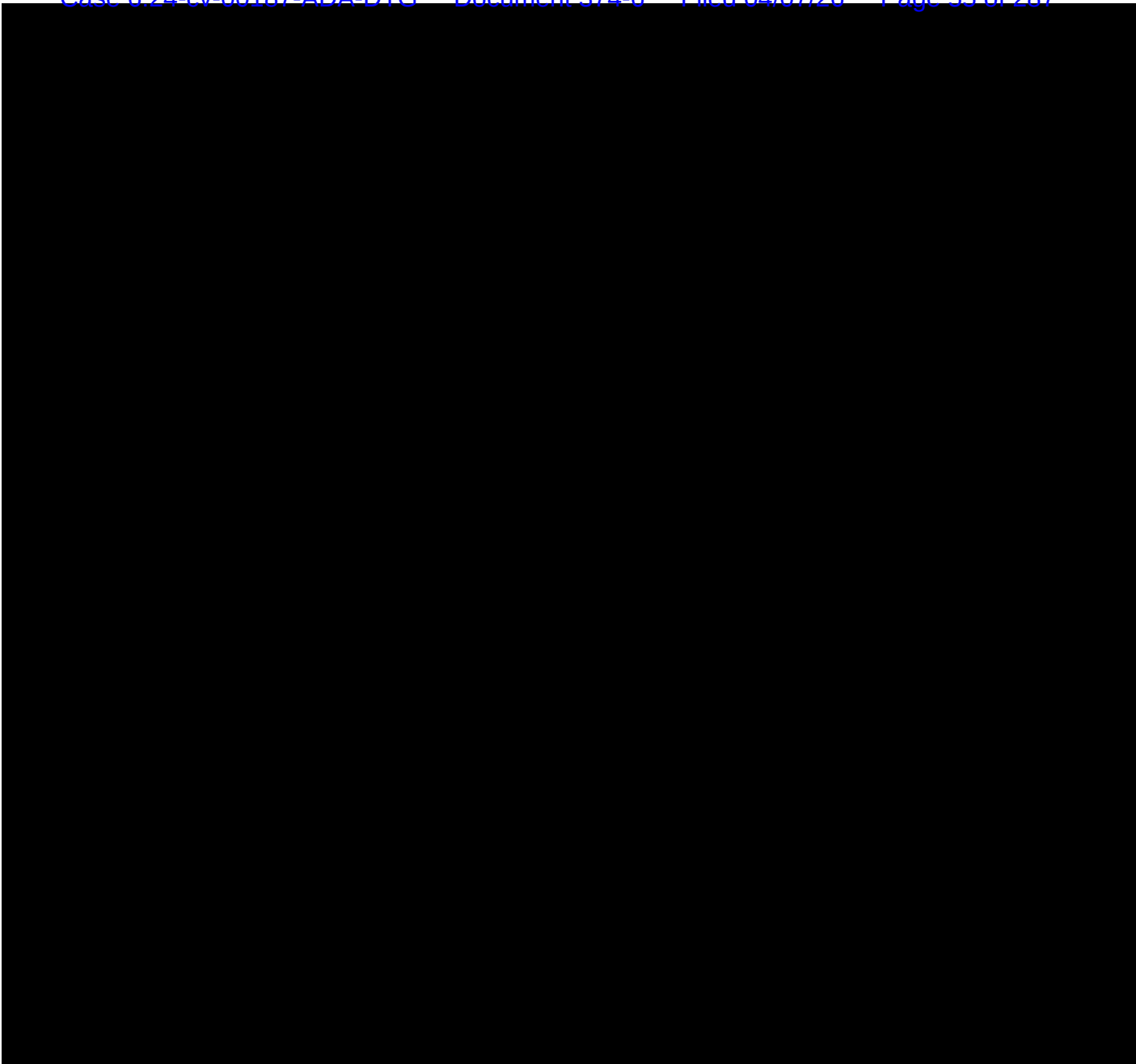
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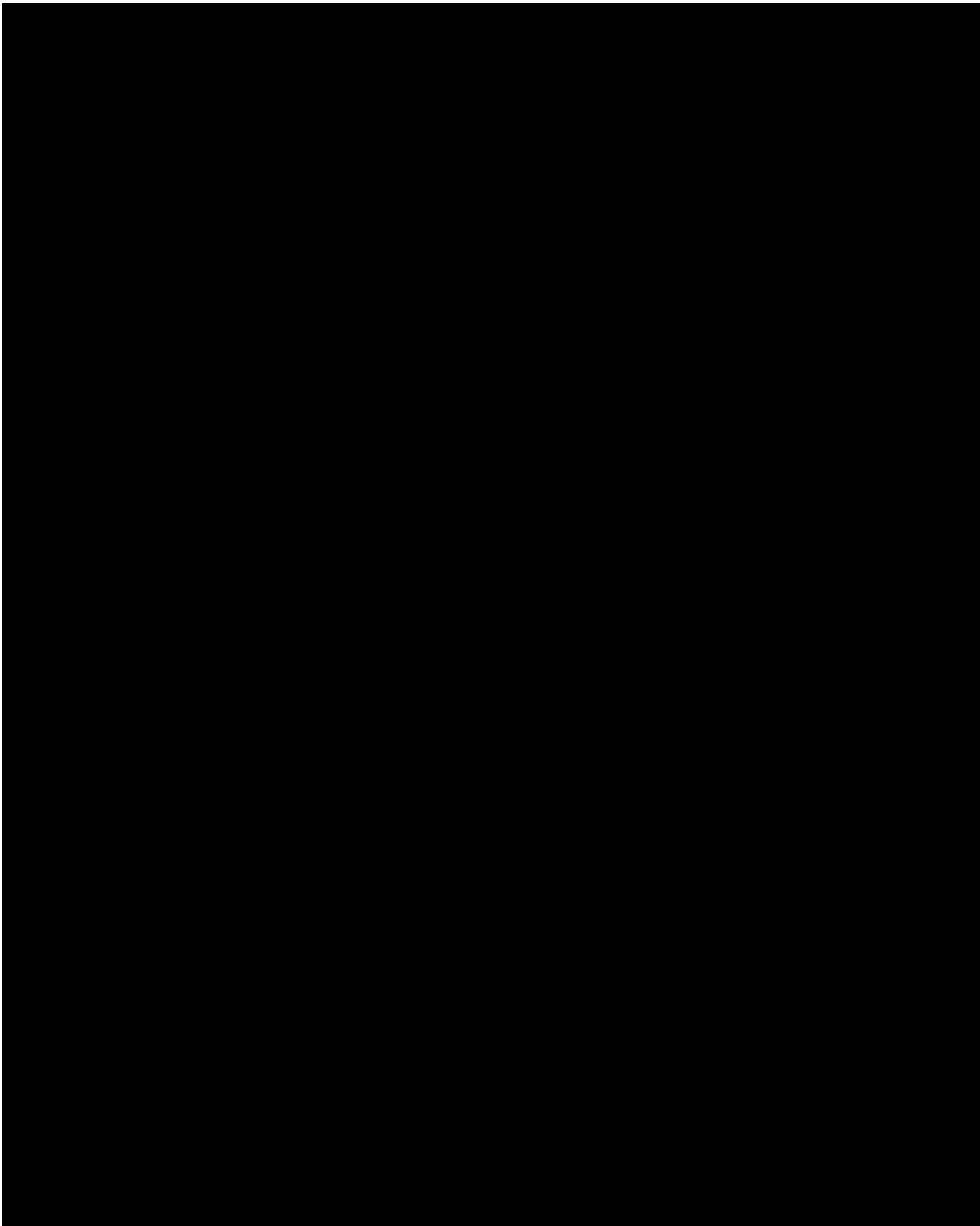
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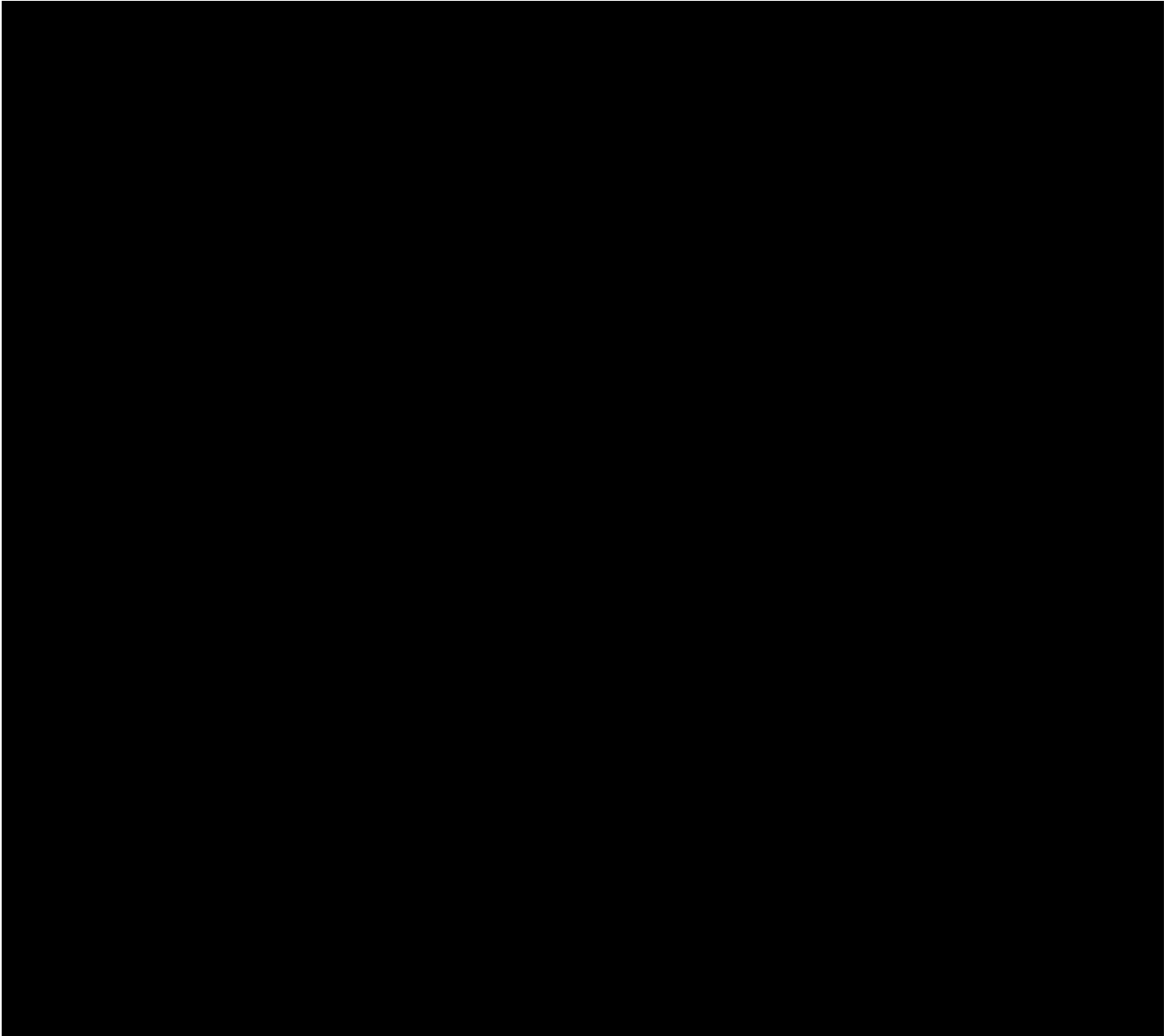
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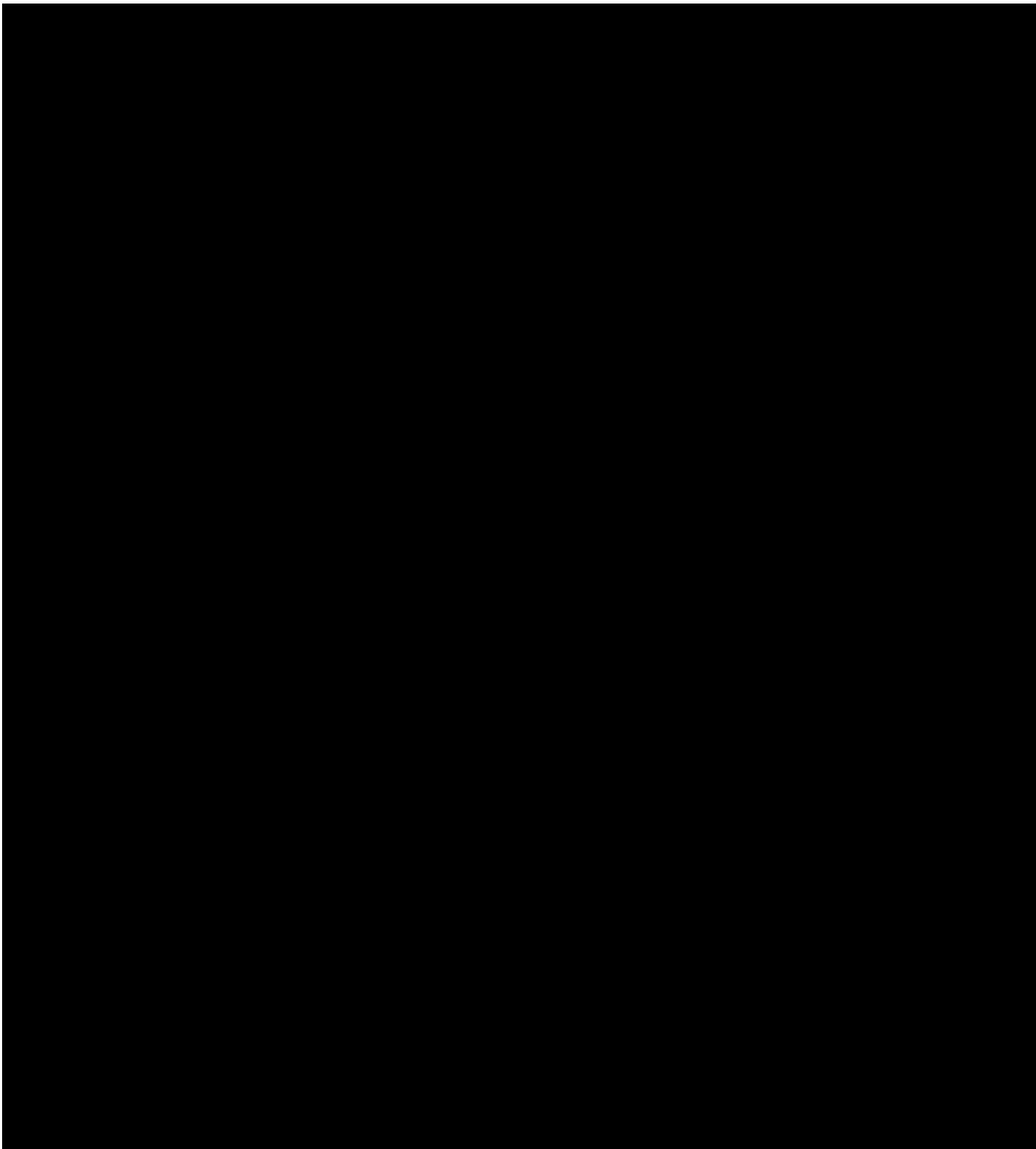
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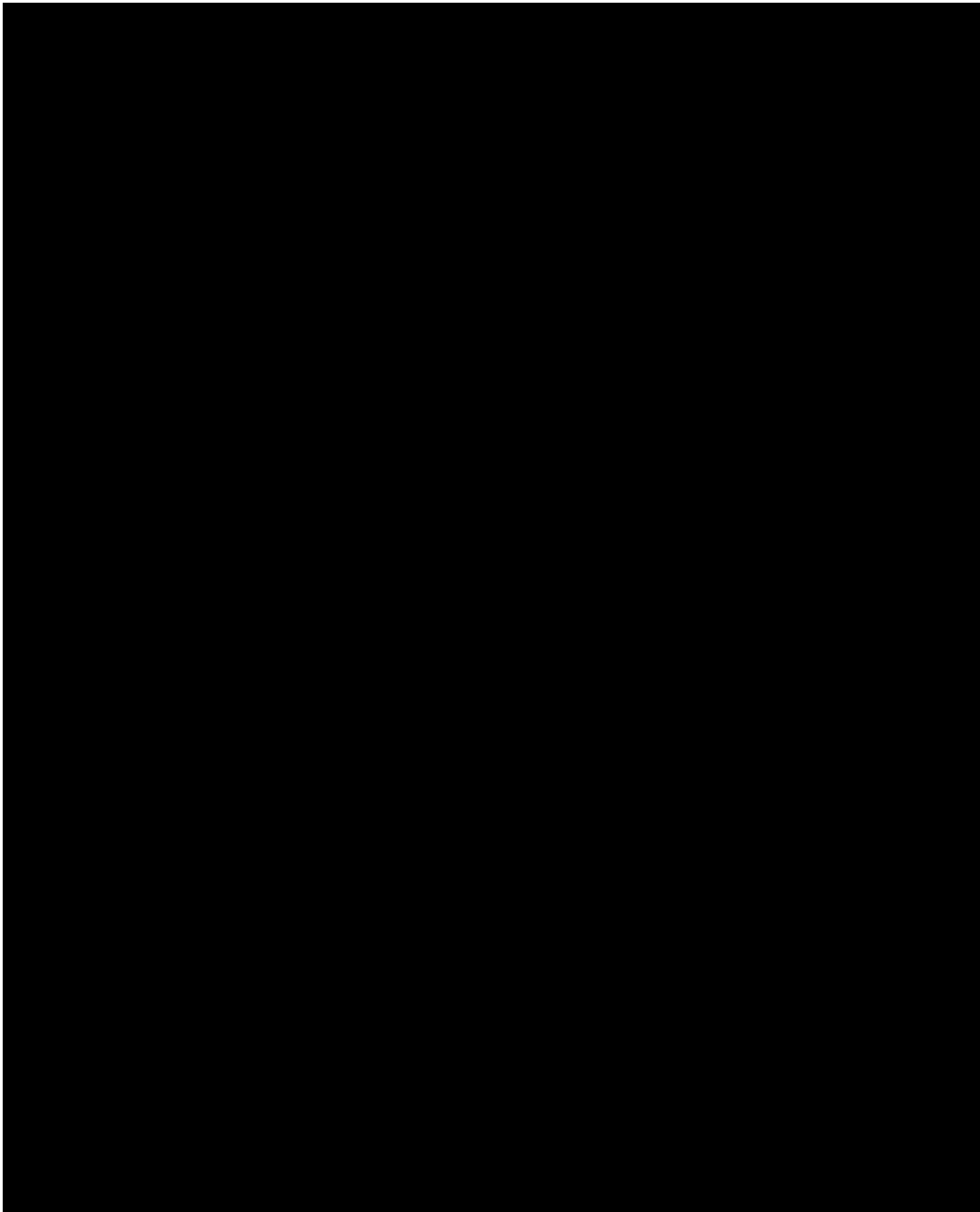
Age Group	Percentage
18-29	88%
30-49	85%
50-69	82%
70+	75%
Don't know	1%

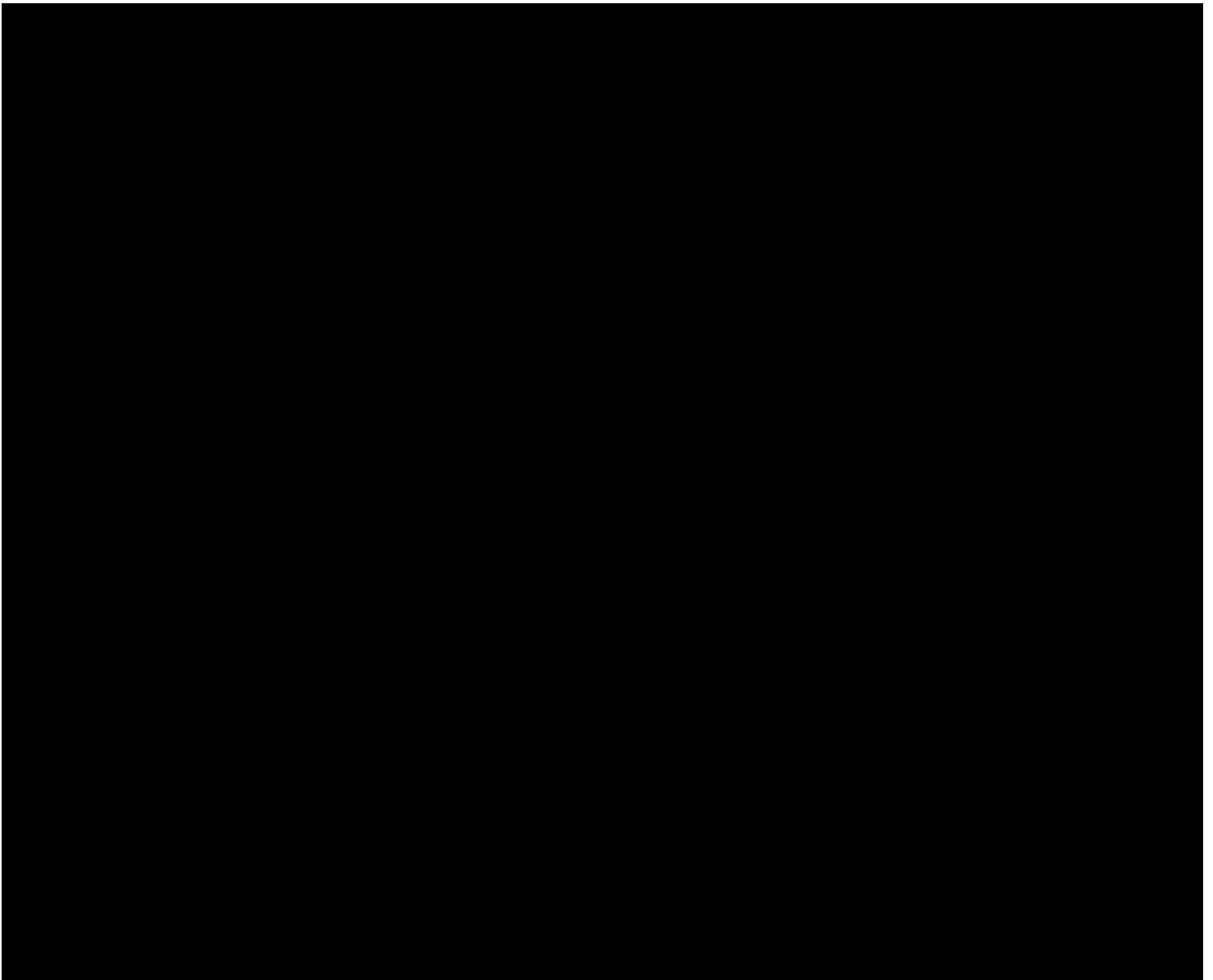


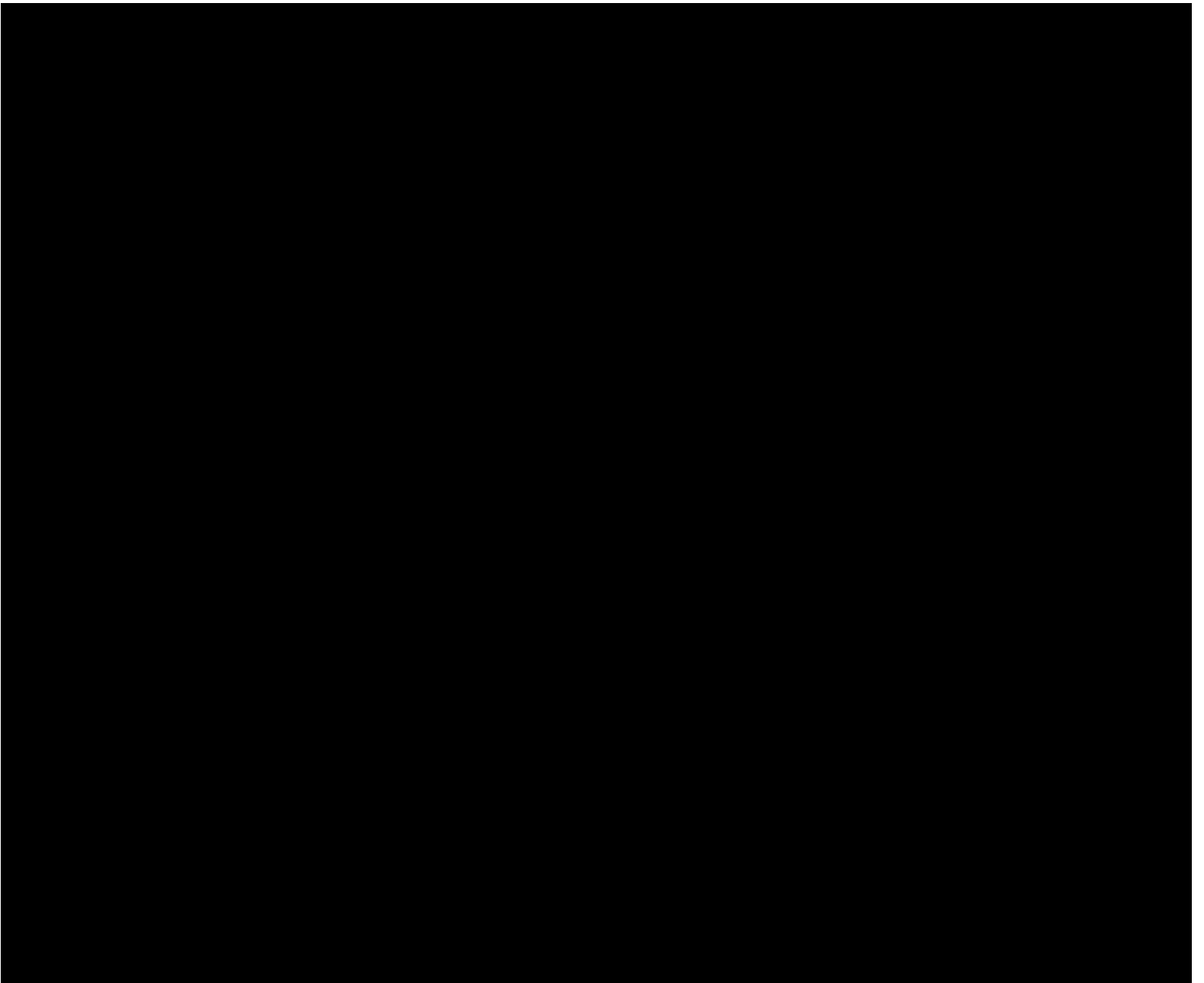


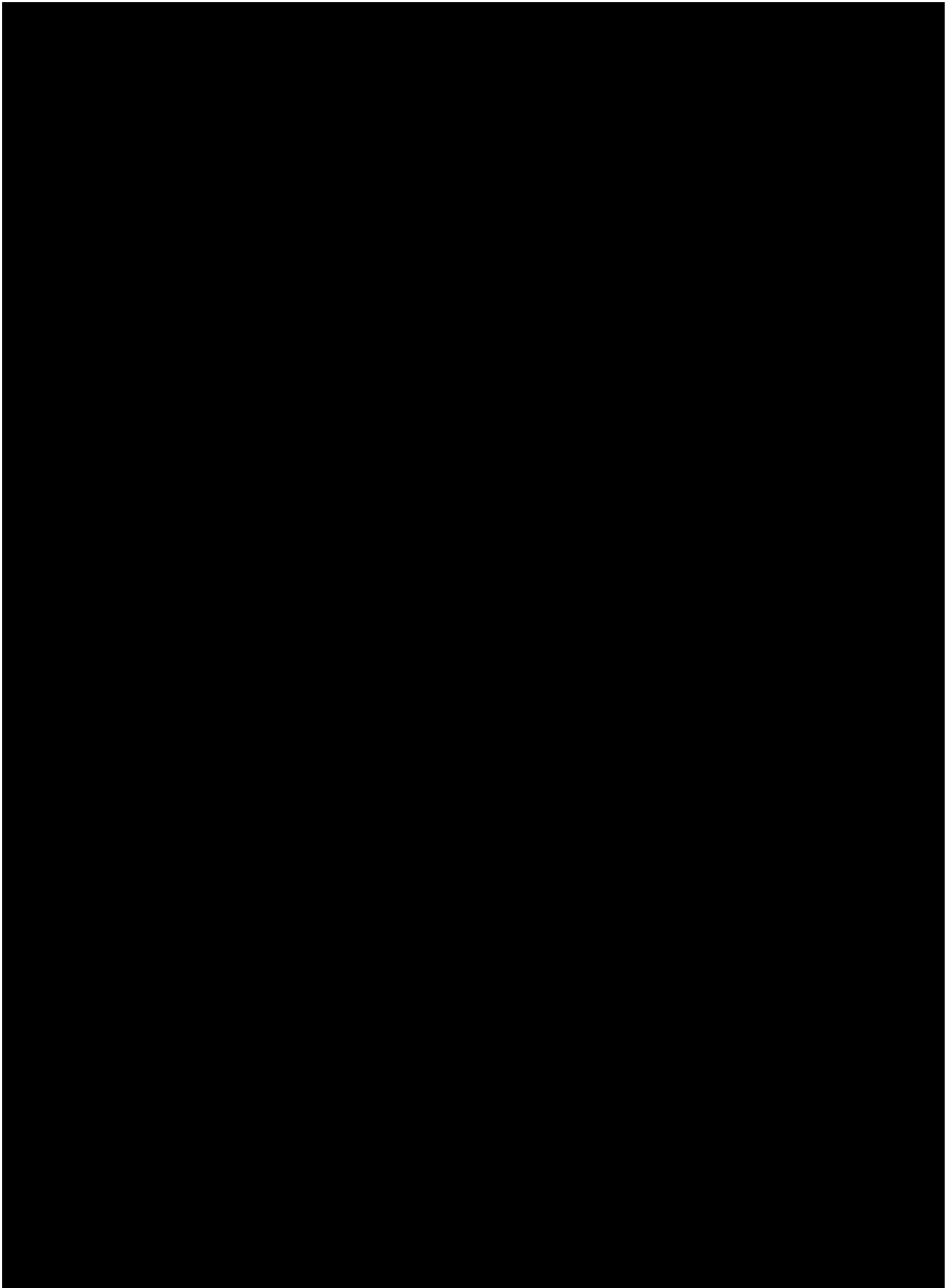


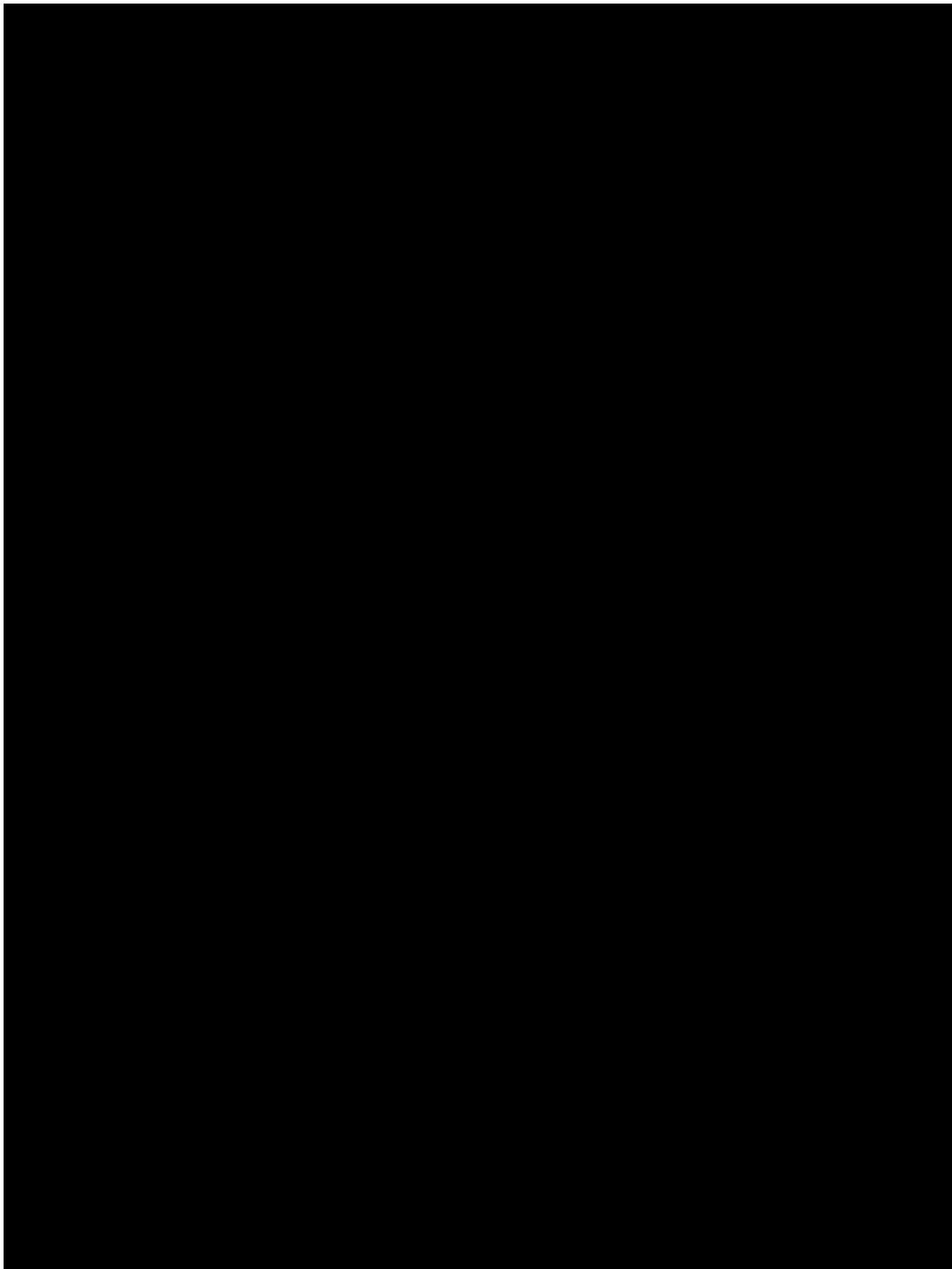












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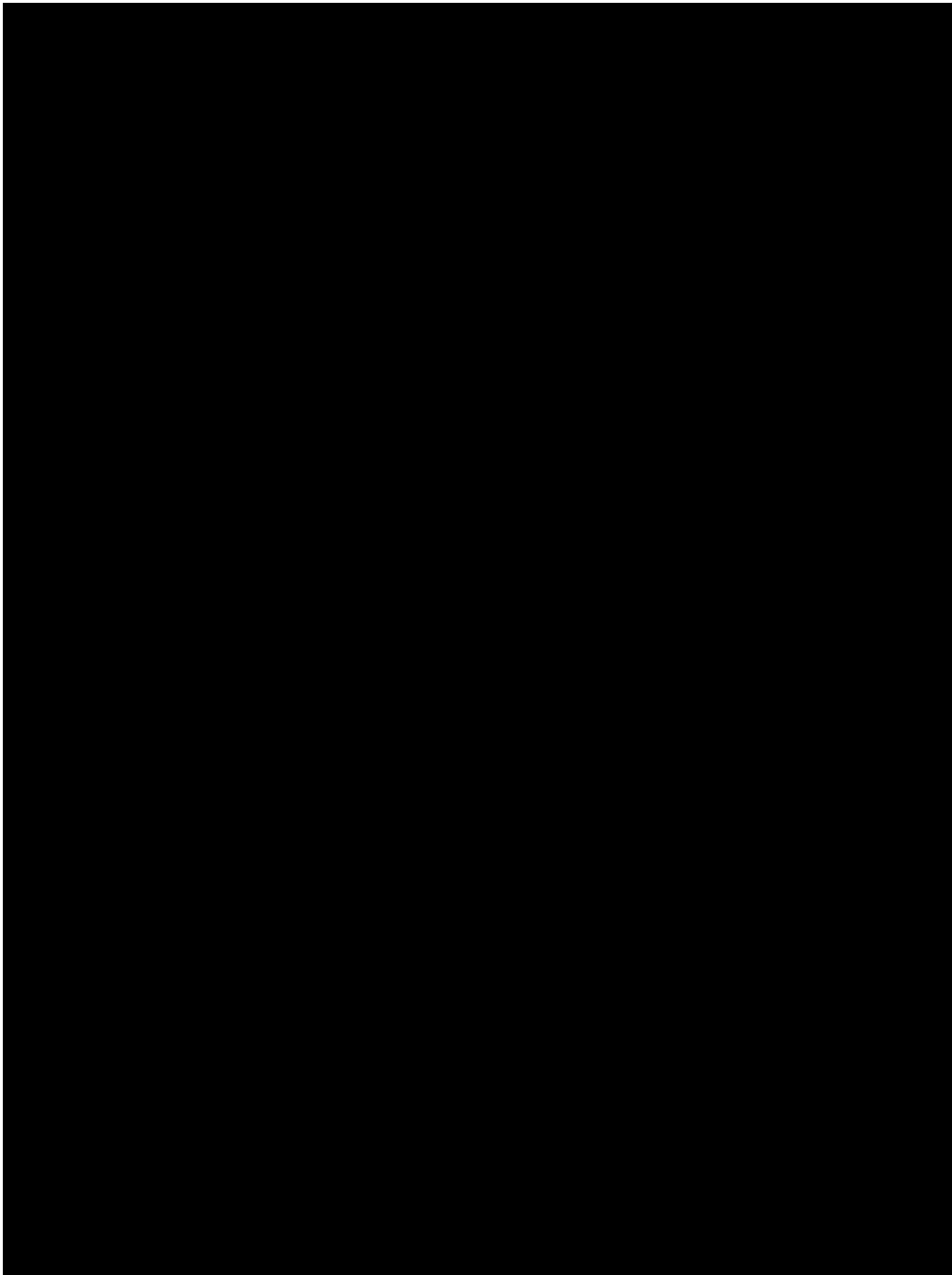
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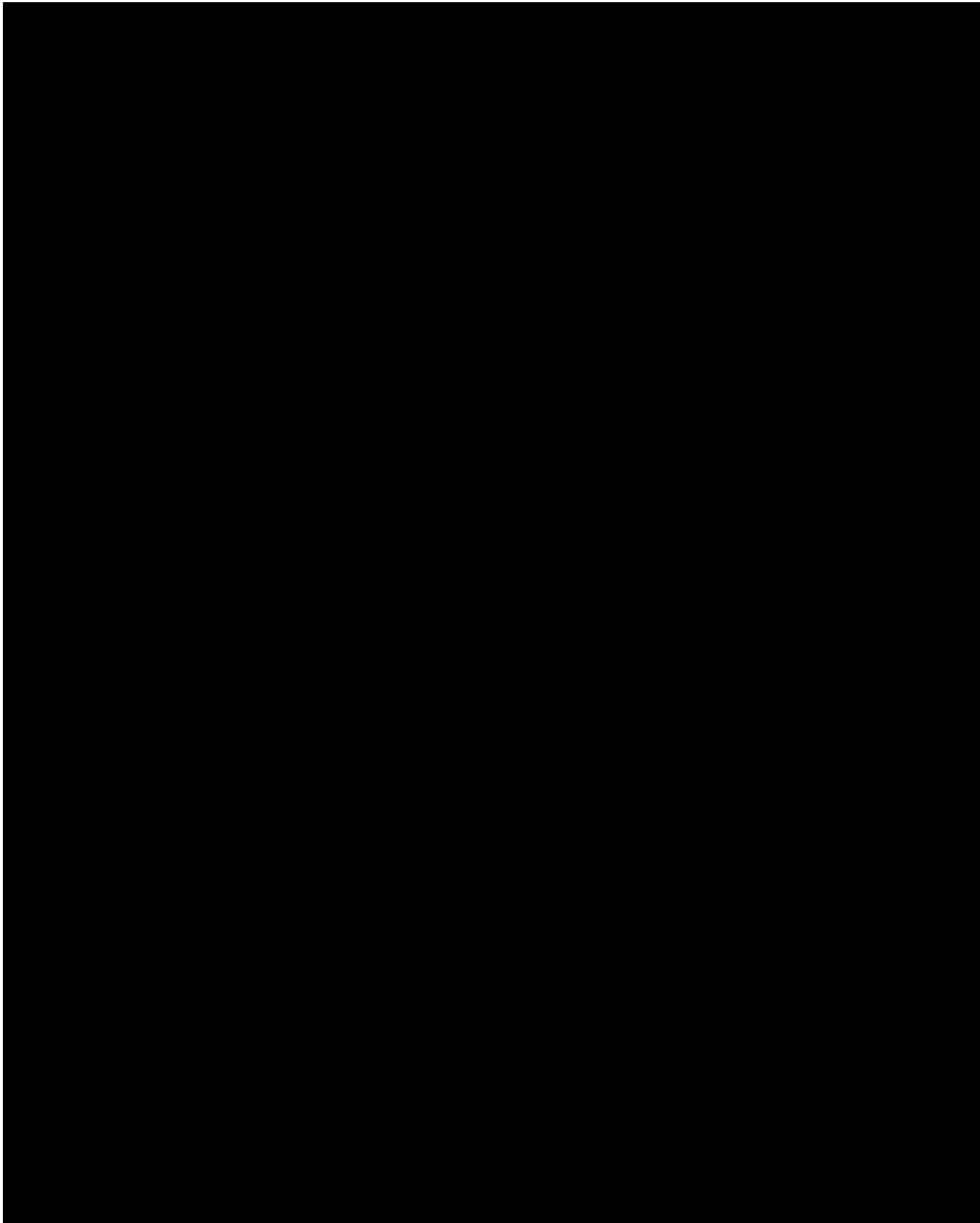
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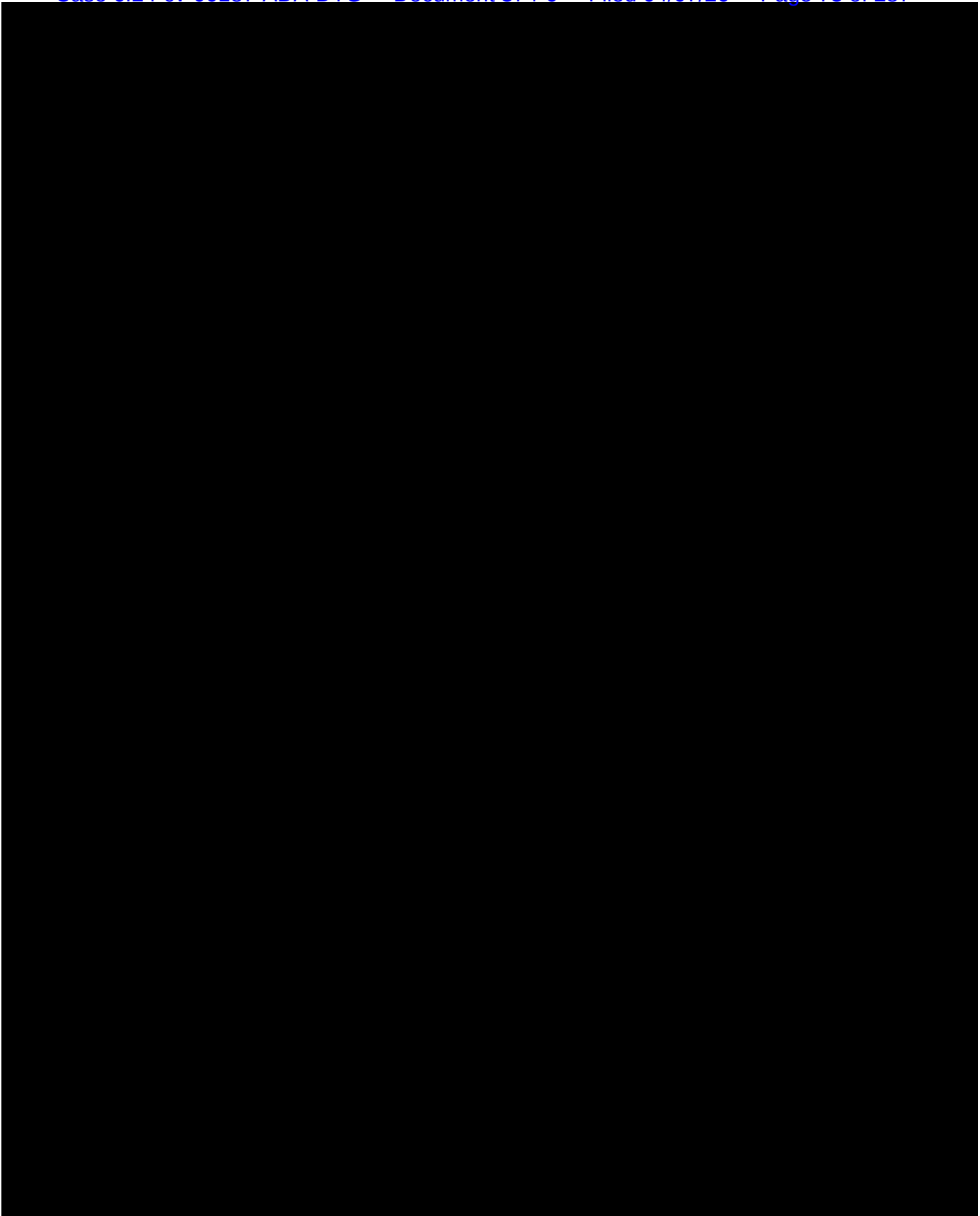
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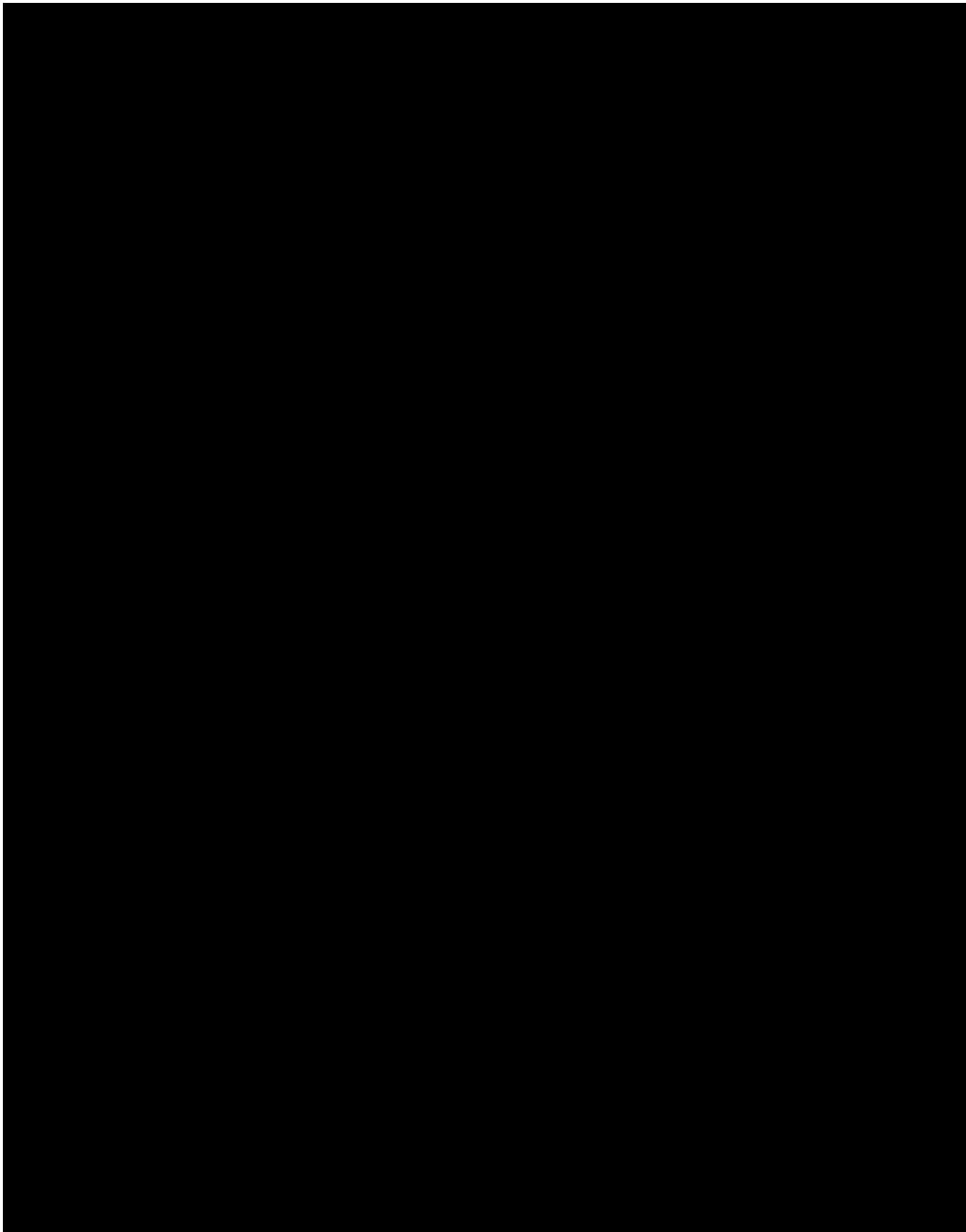
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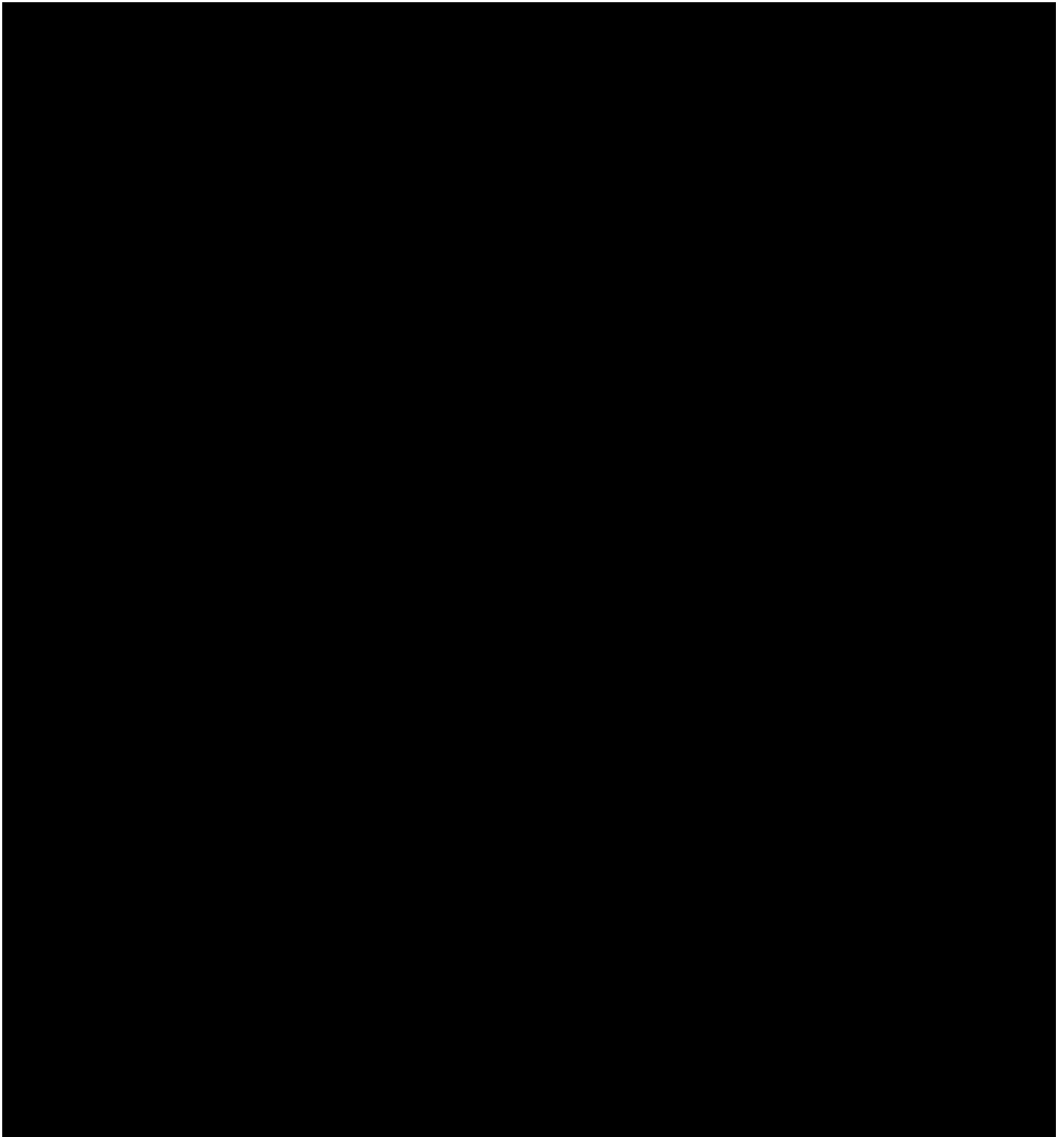
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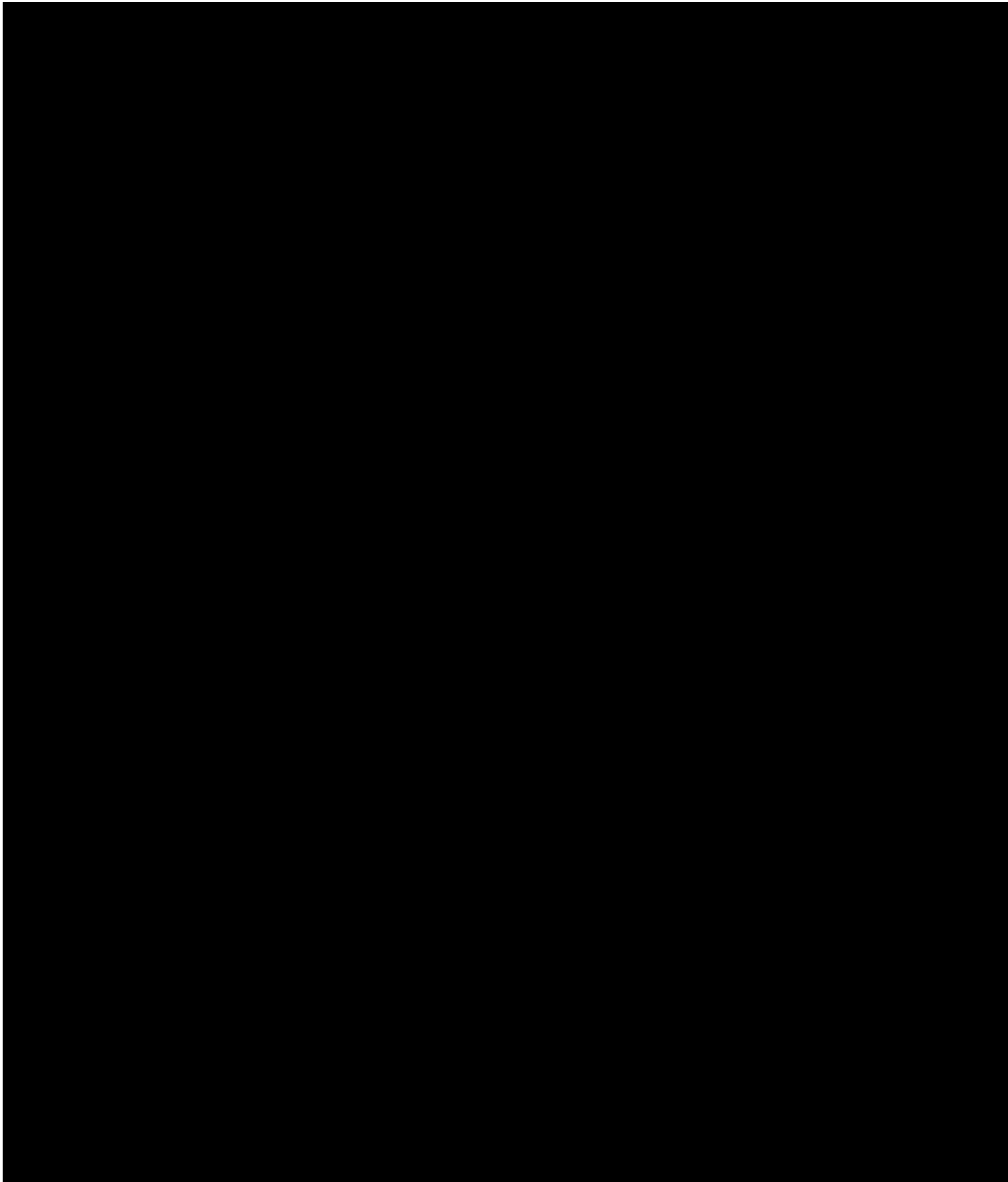


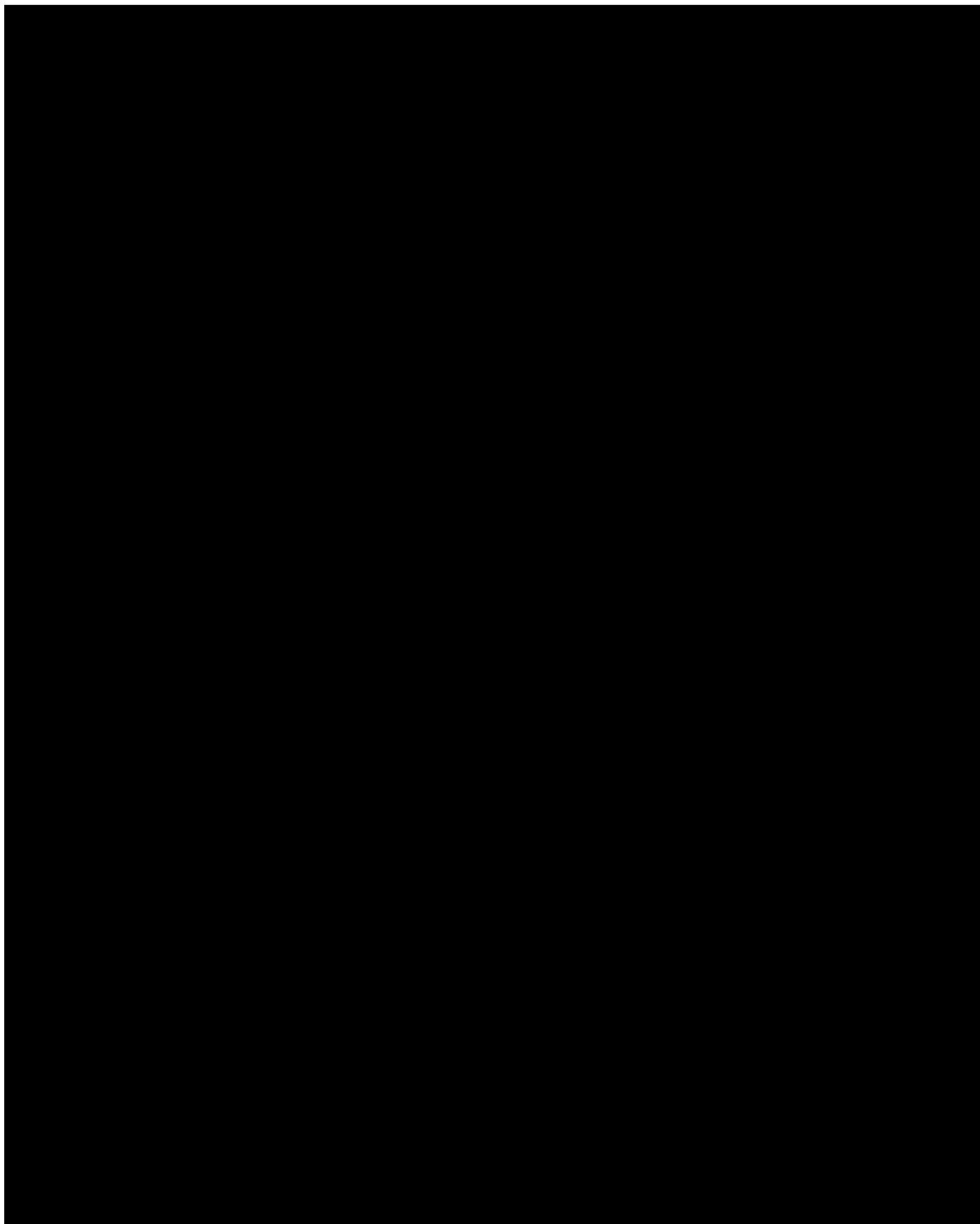


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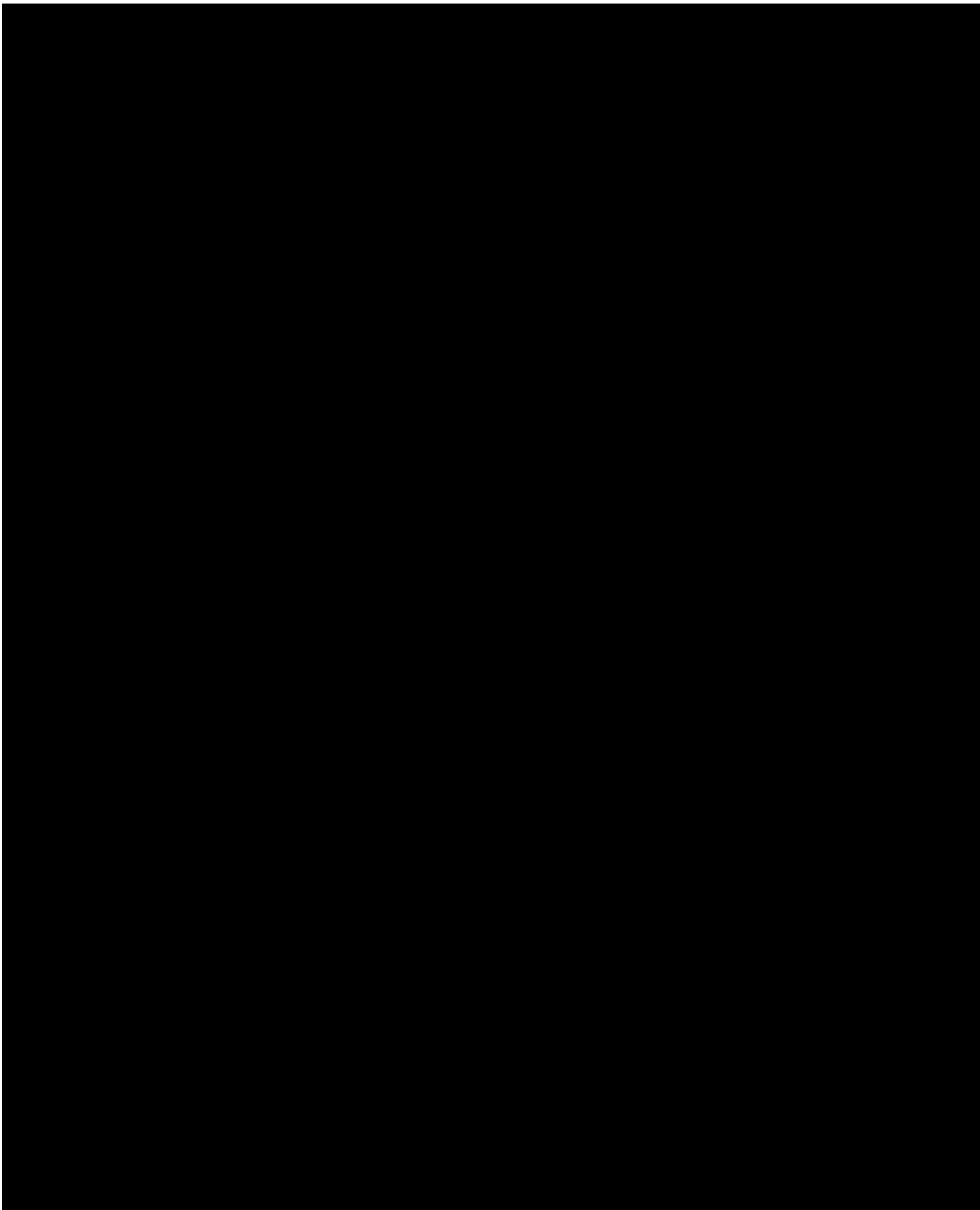
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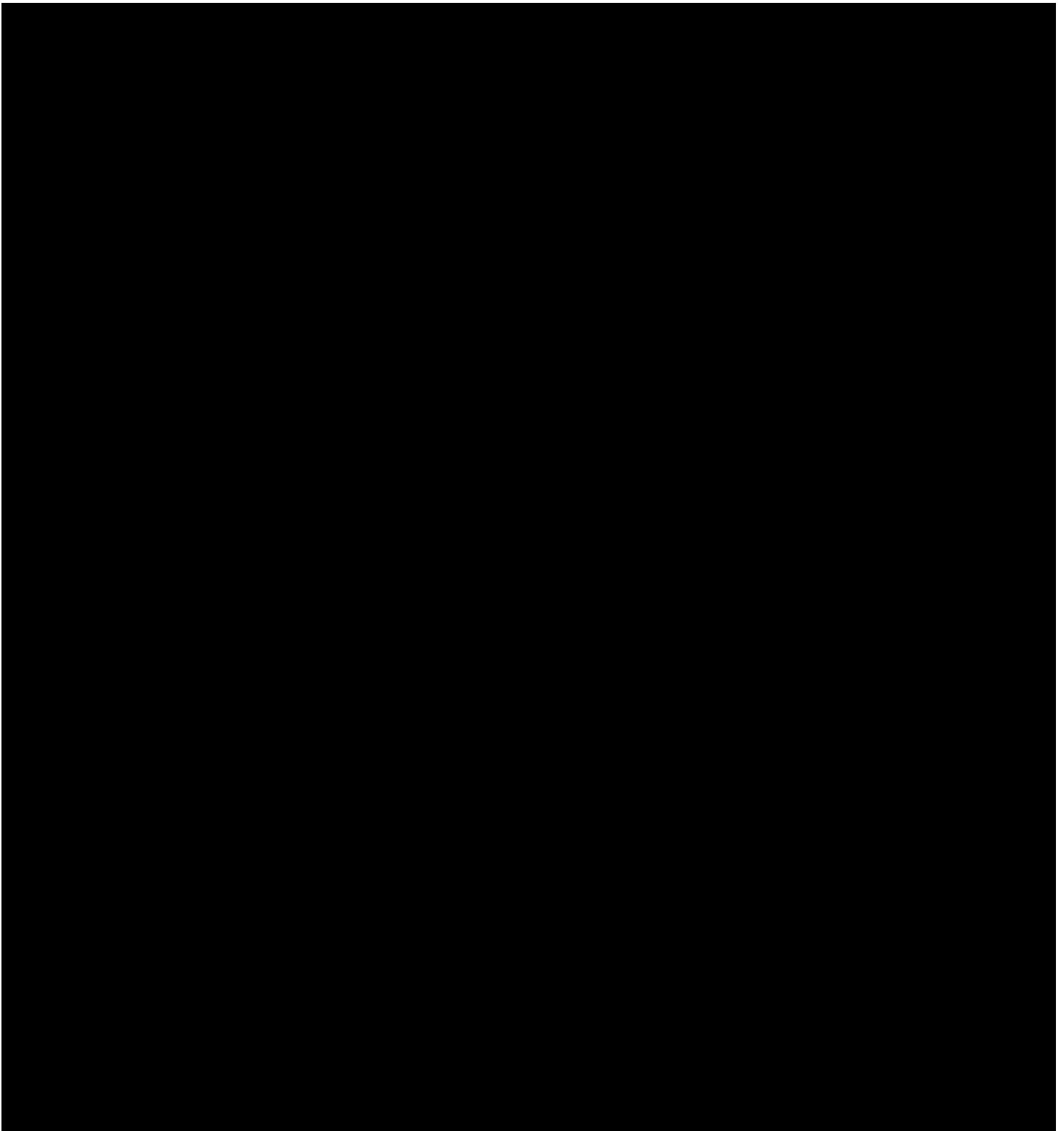
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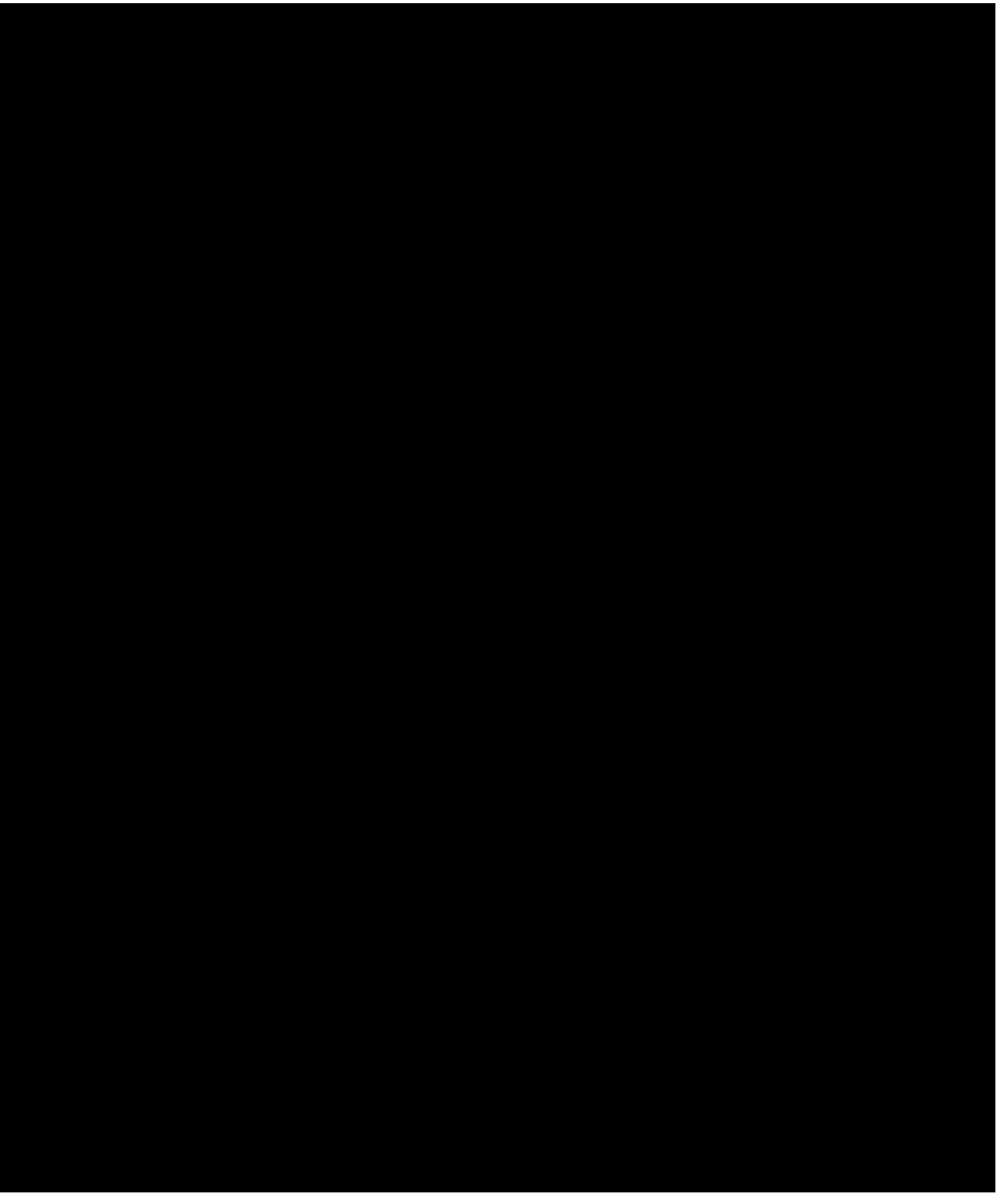




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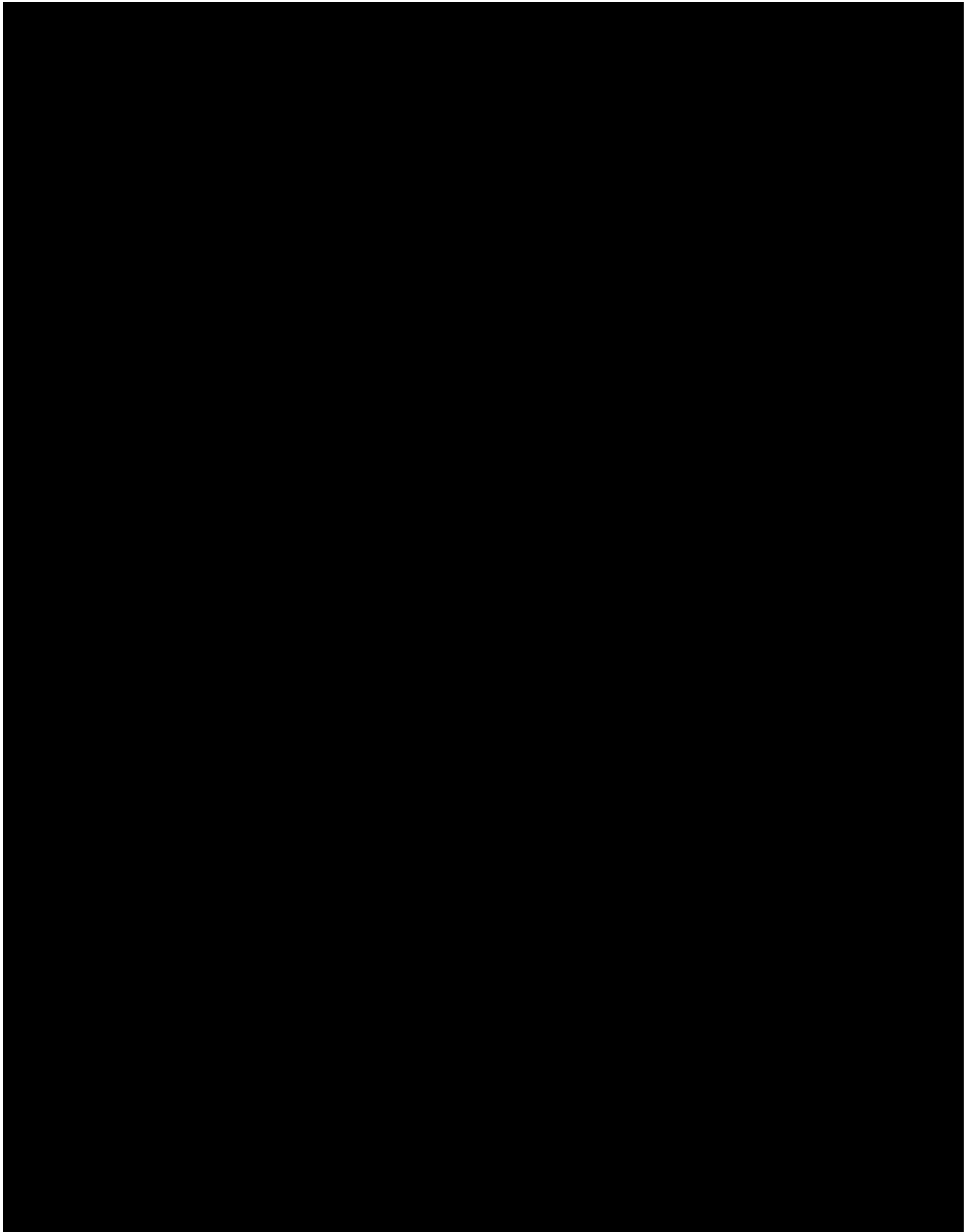
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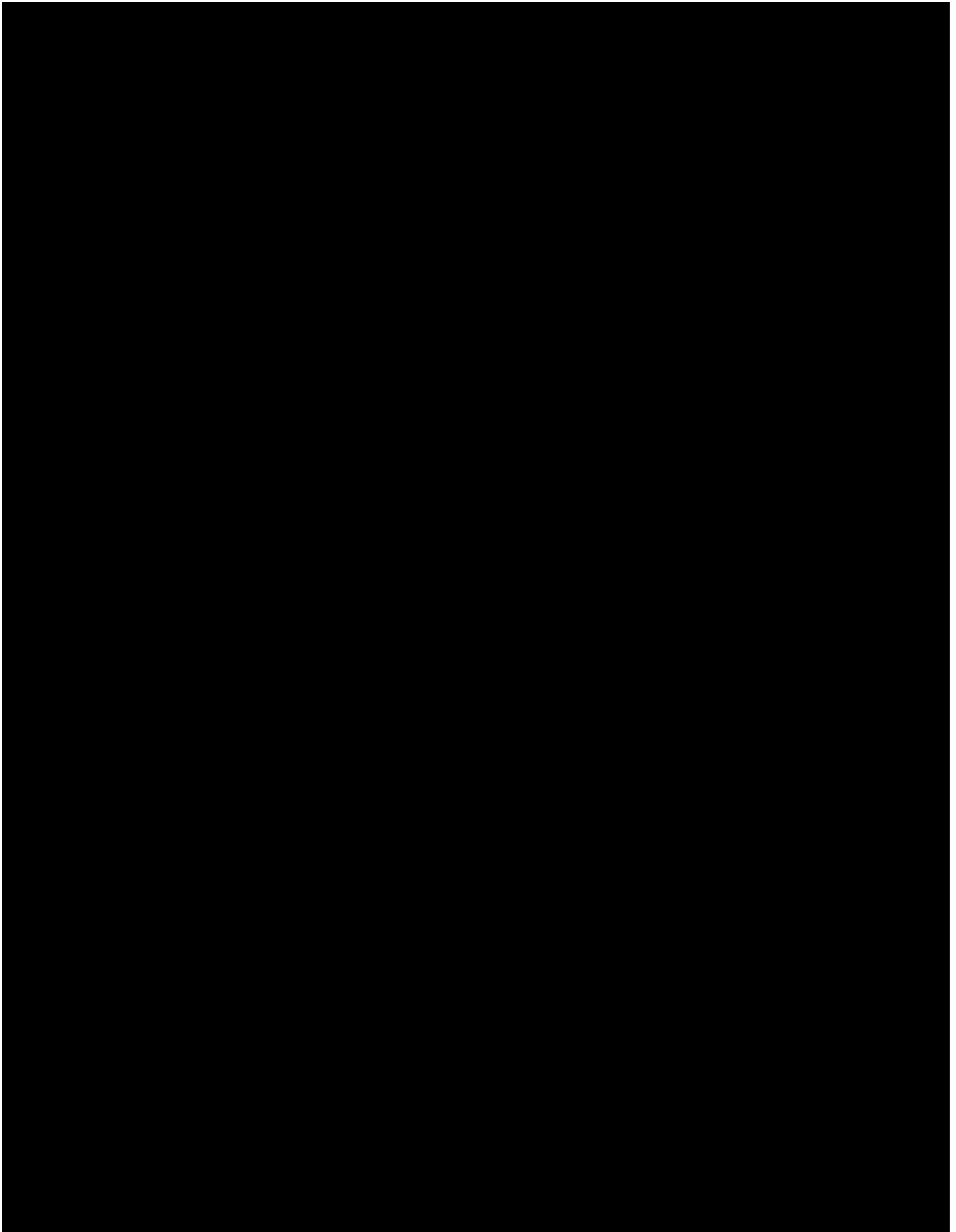
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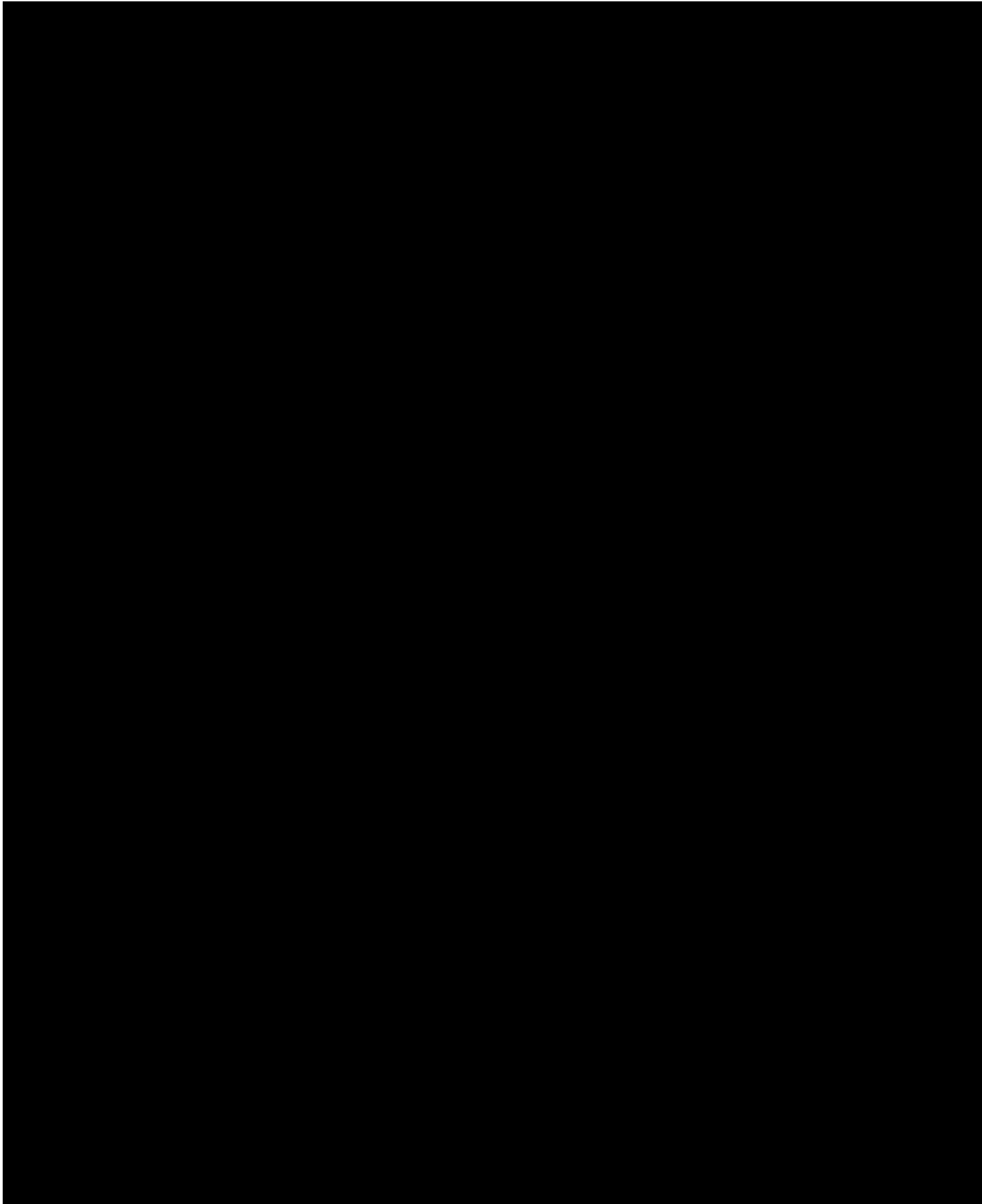
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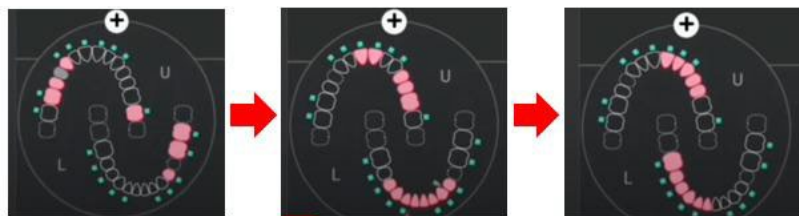
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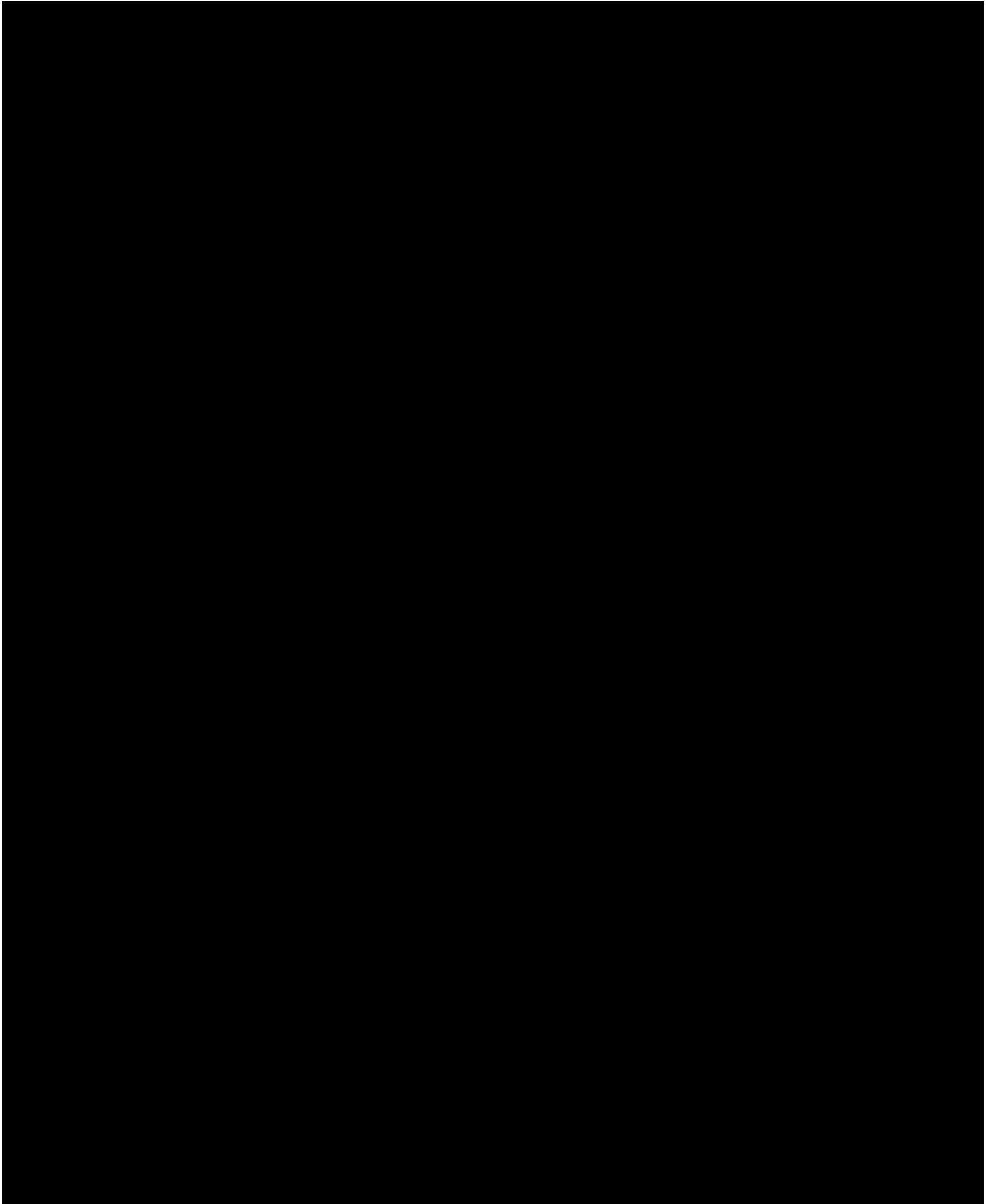
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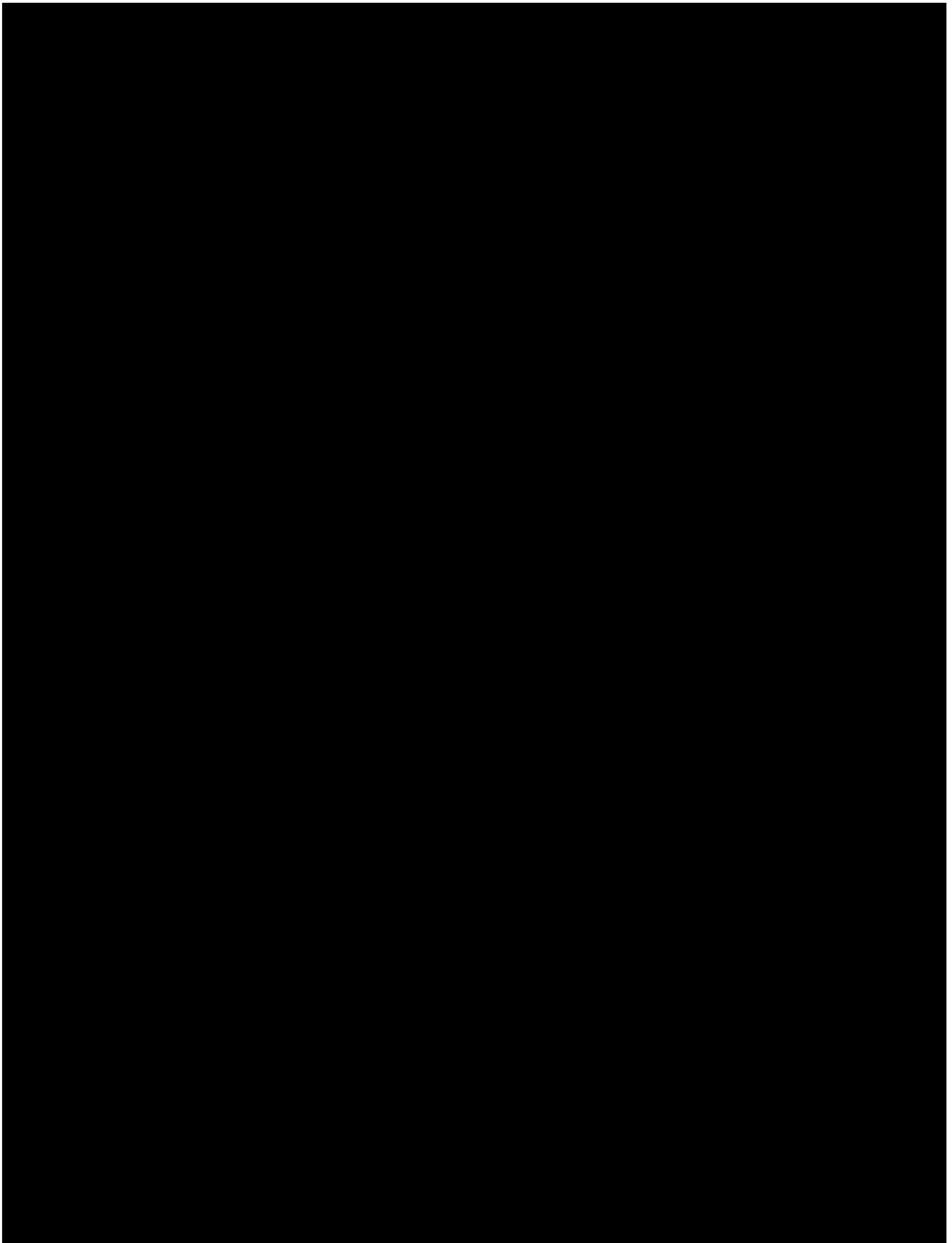
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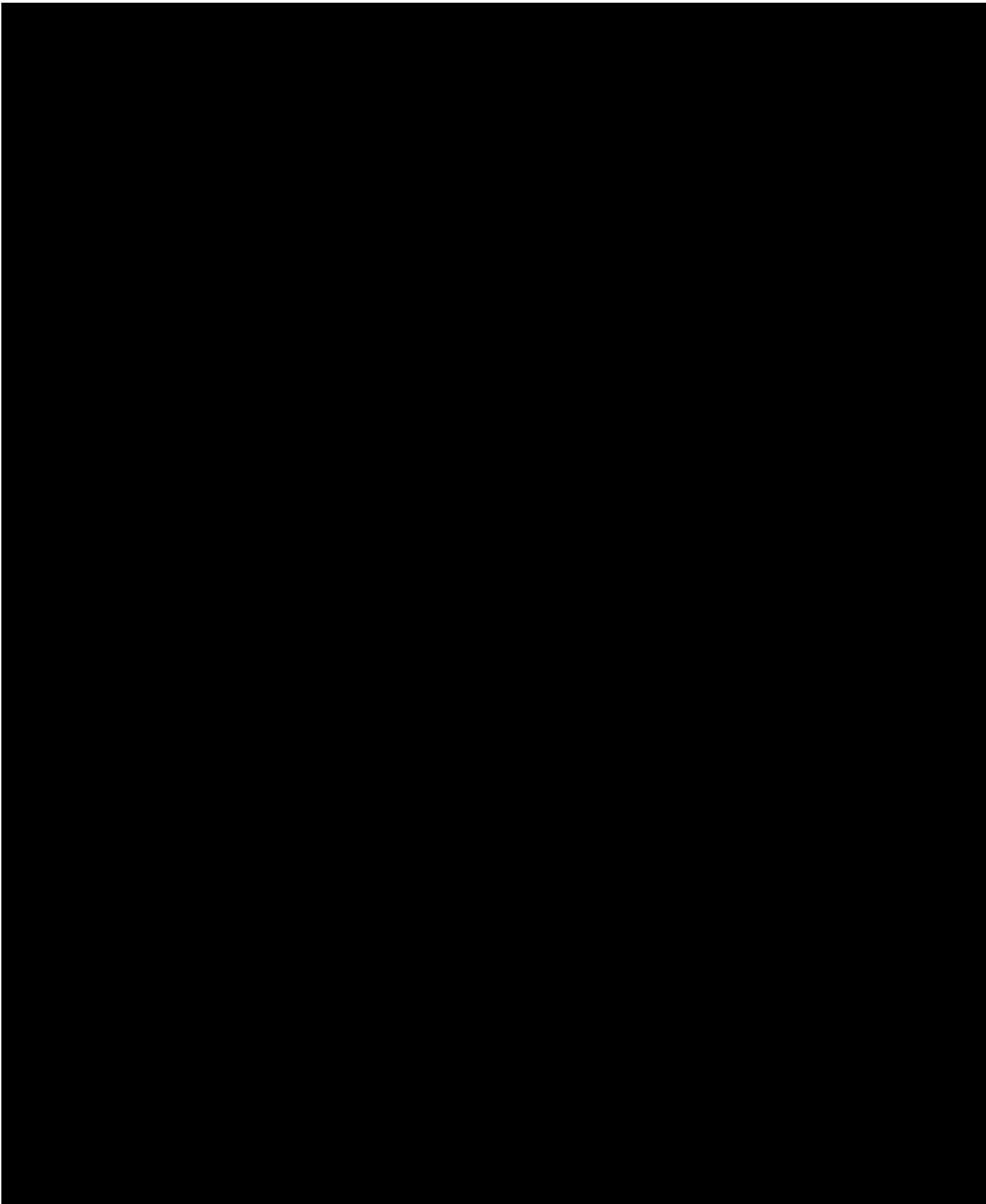
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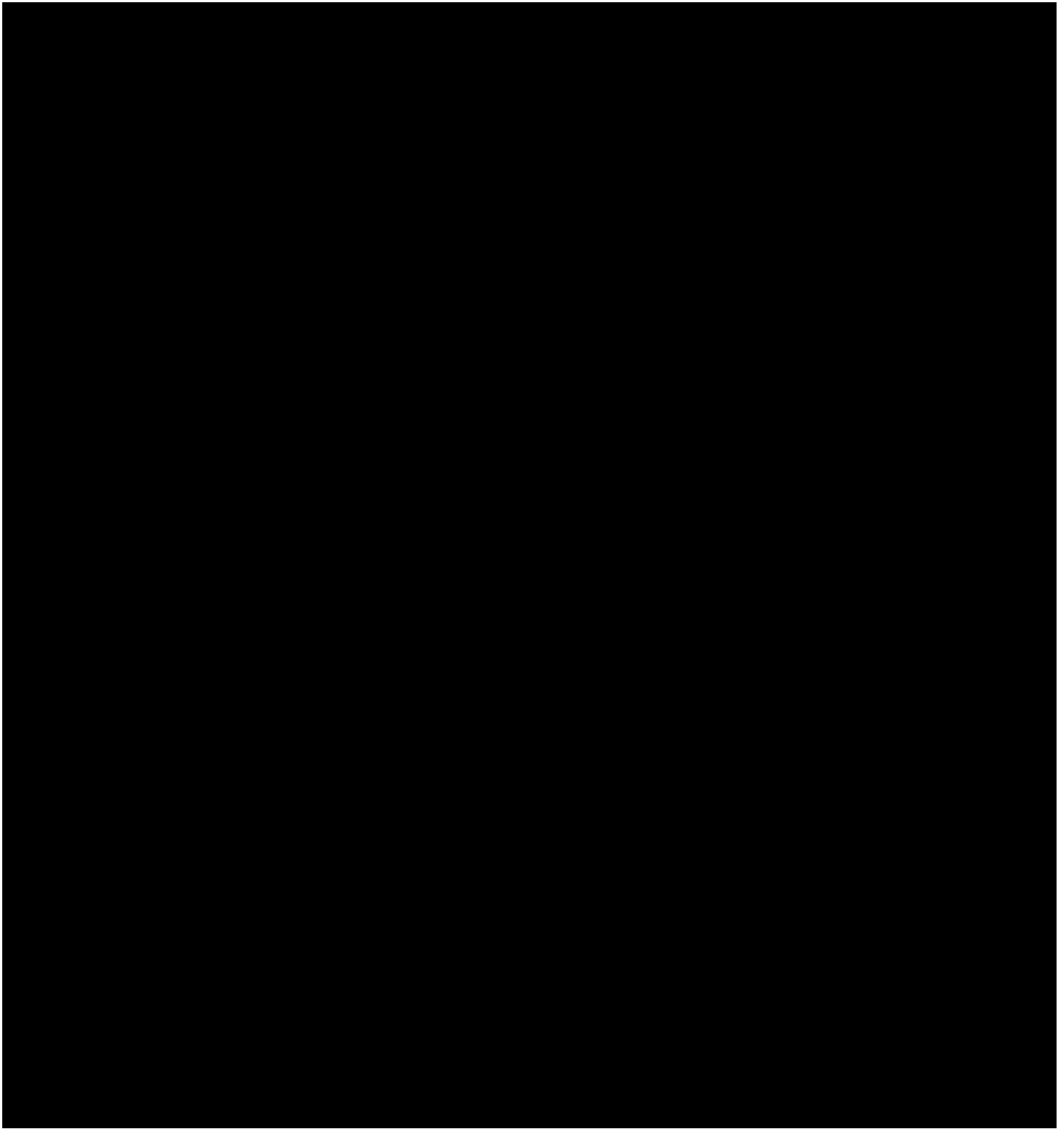
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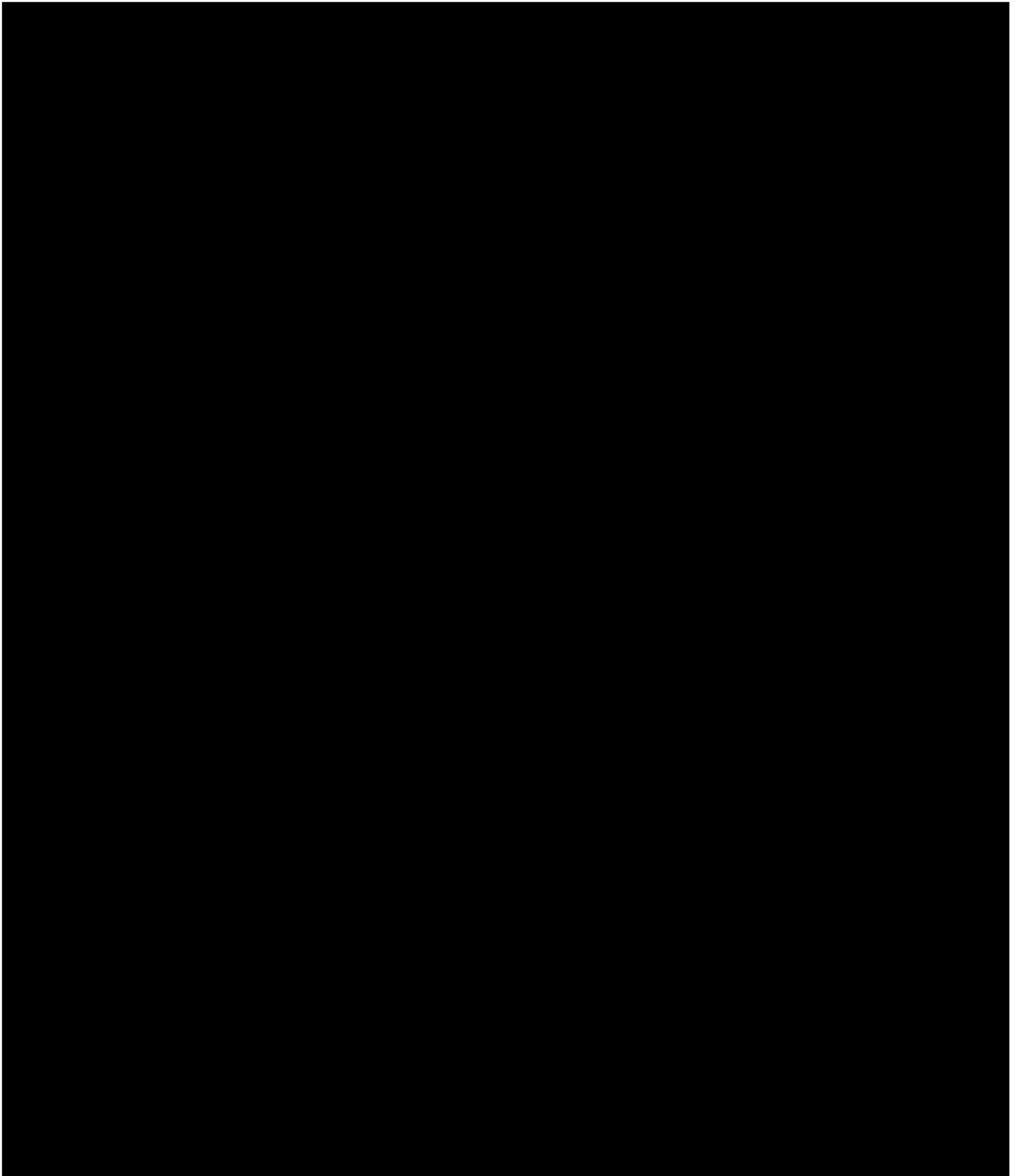


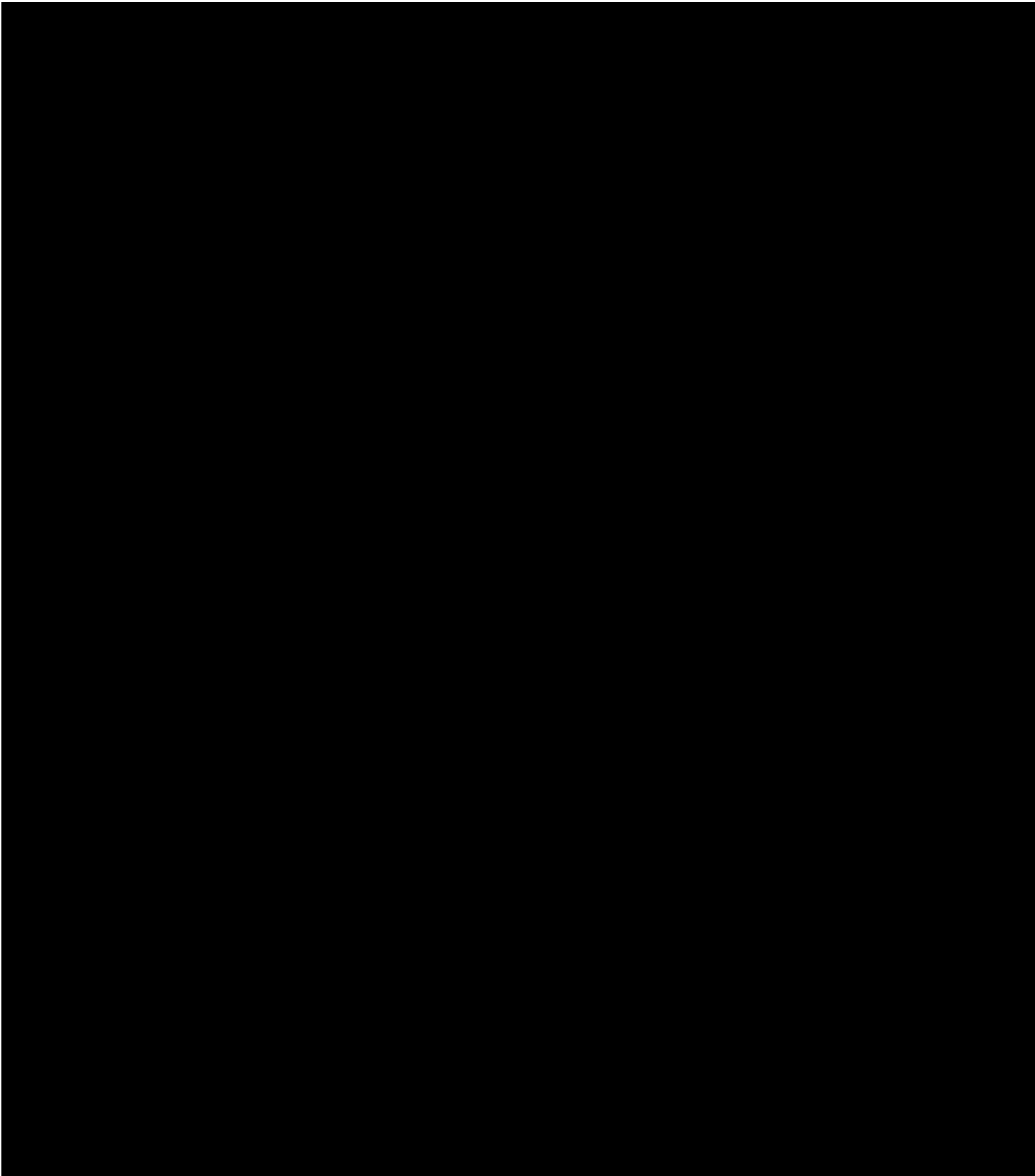
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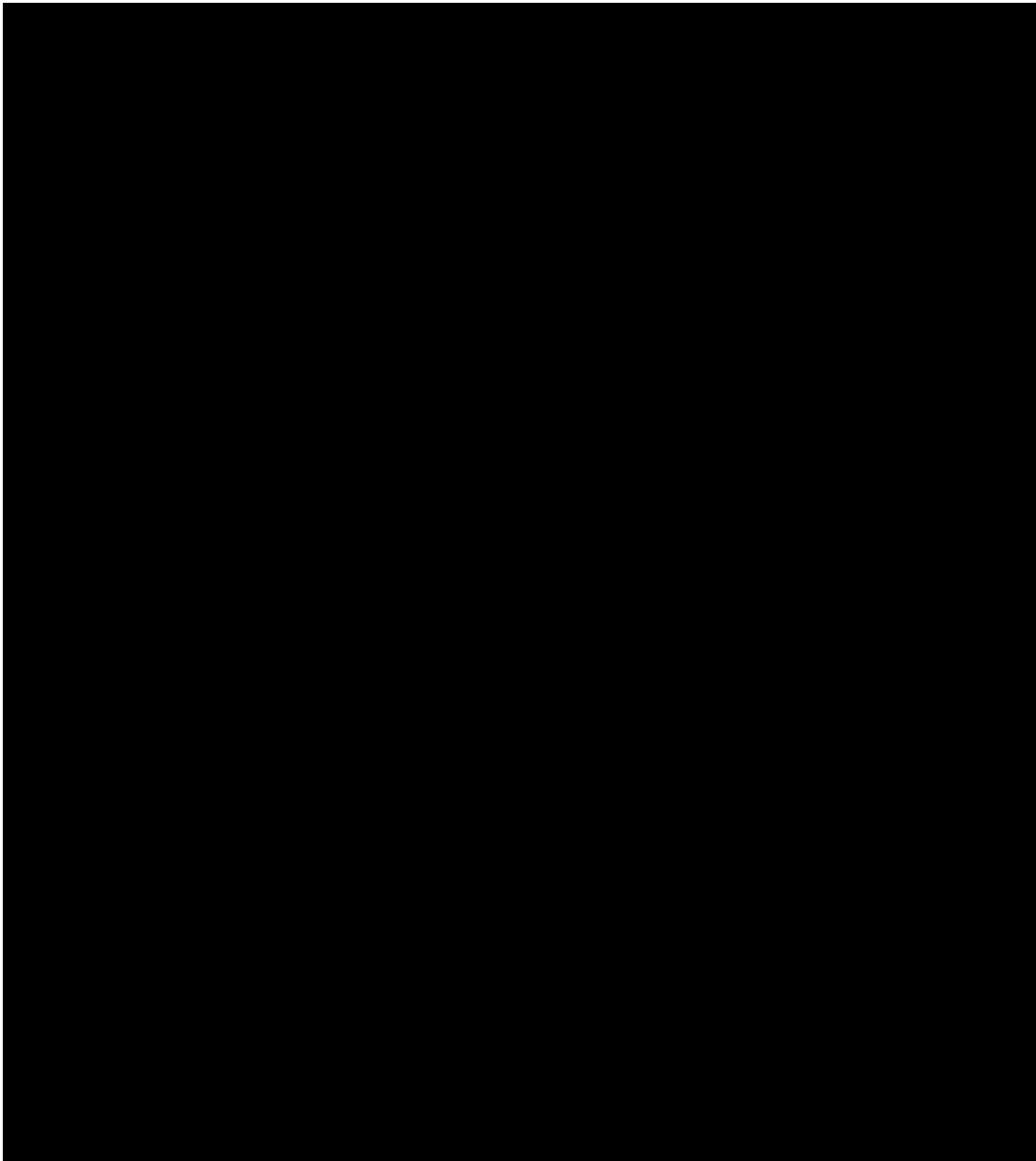




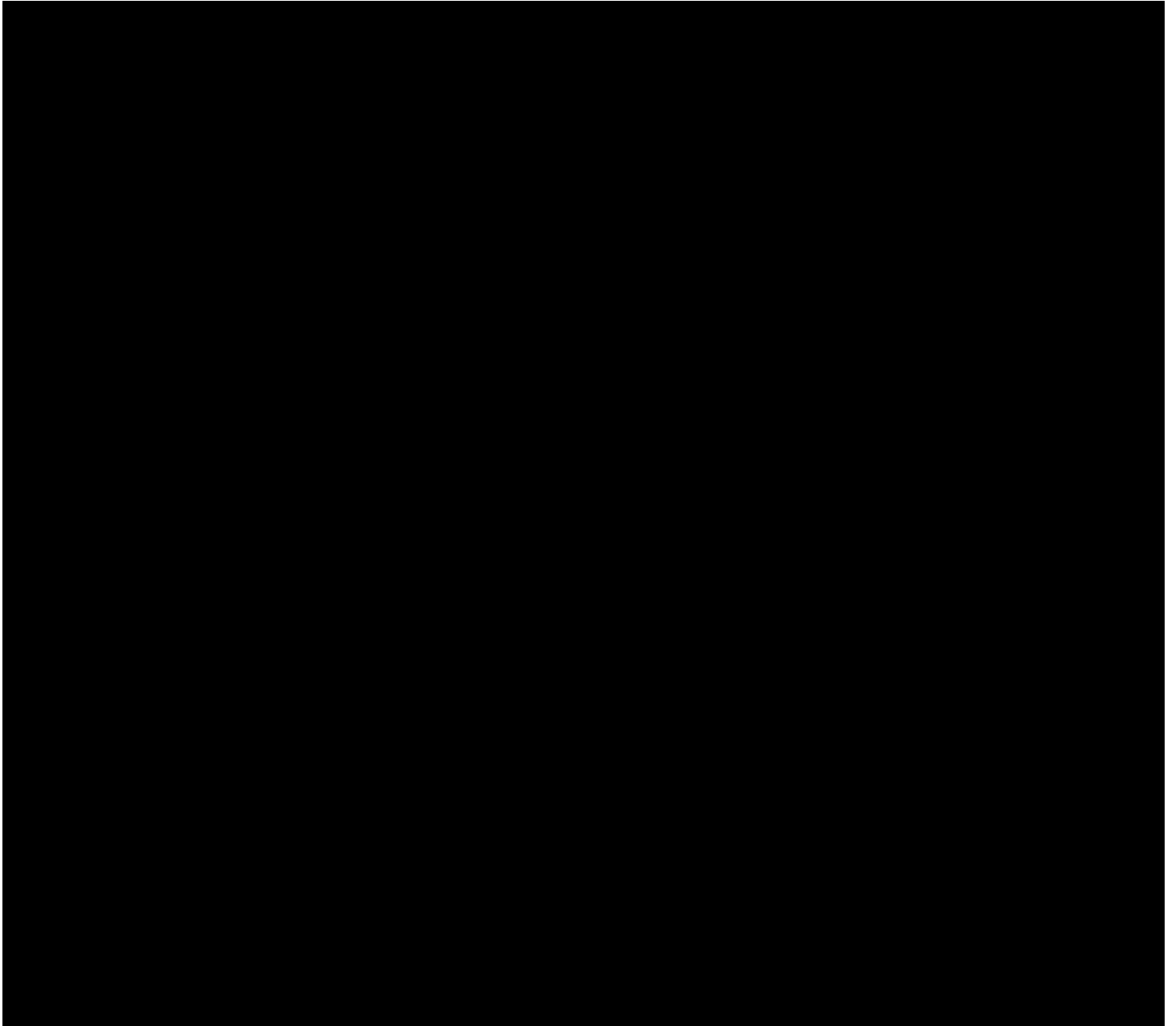


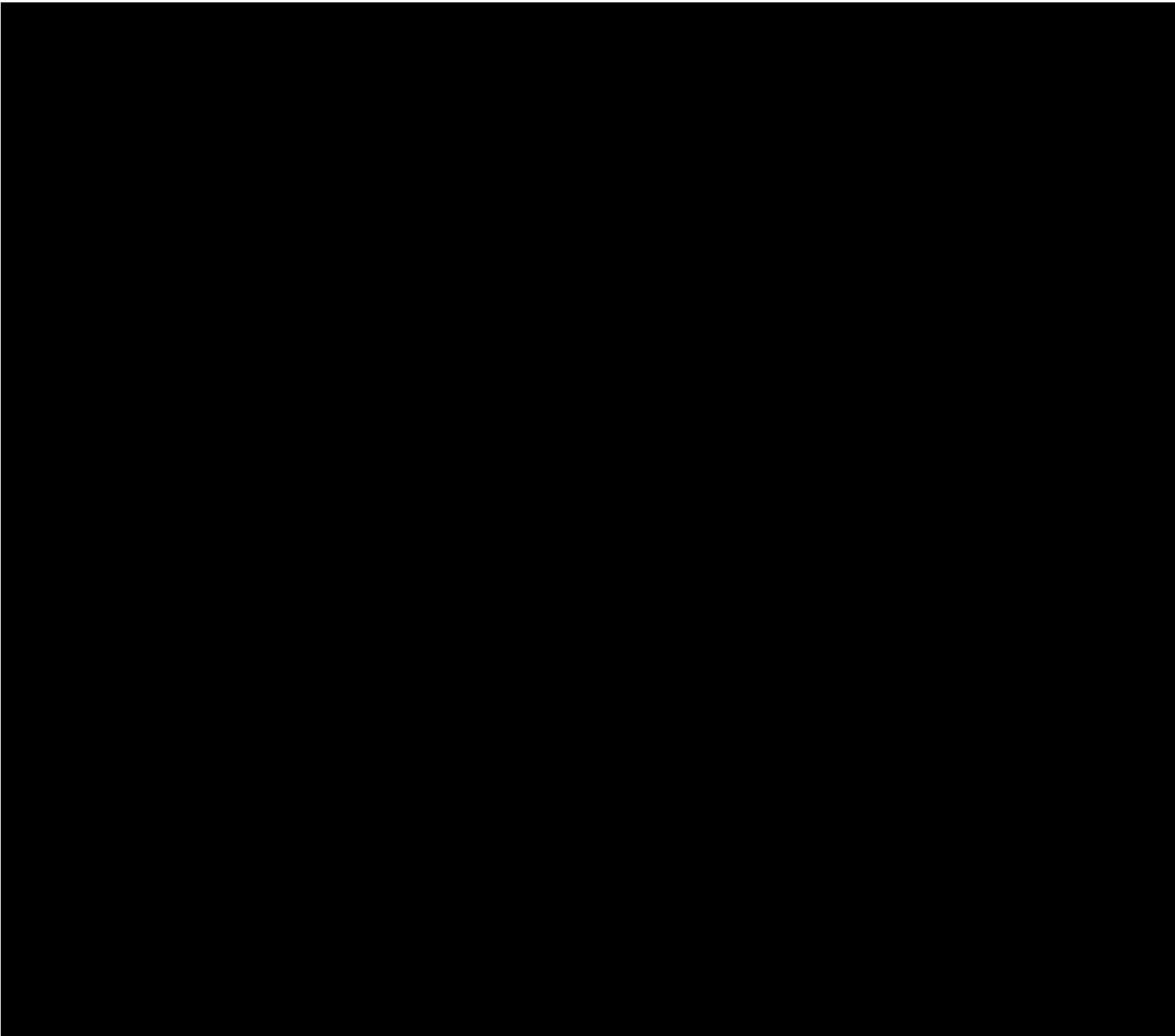


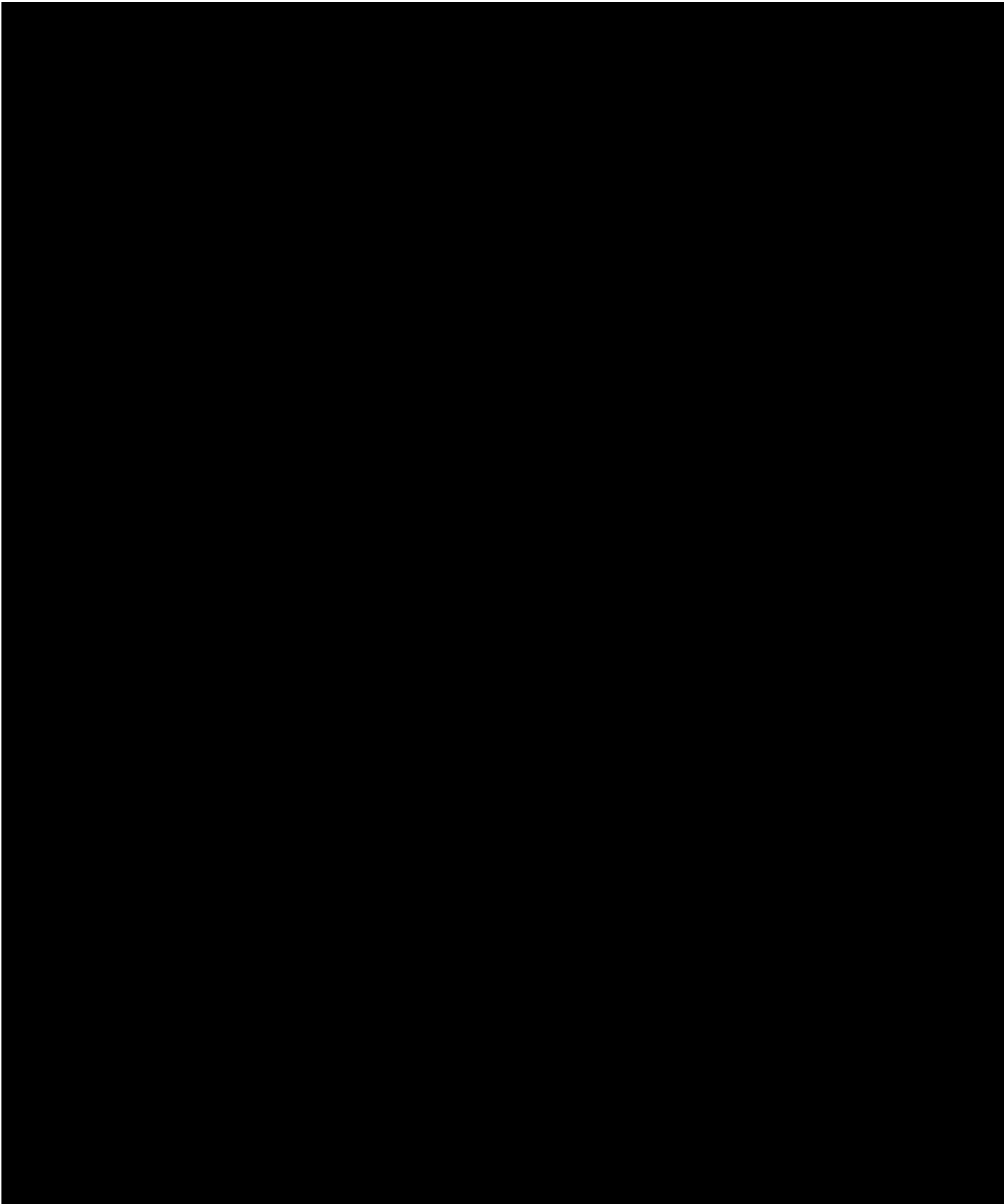


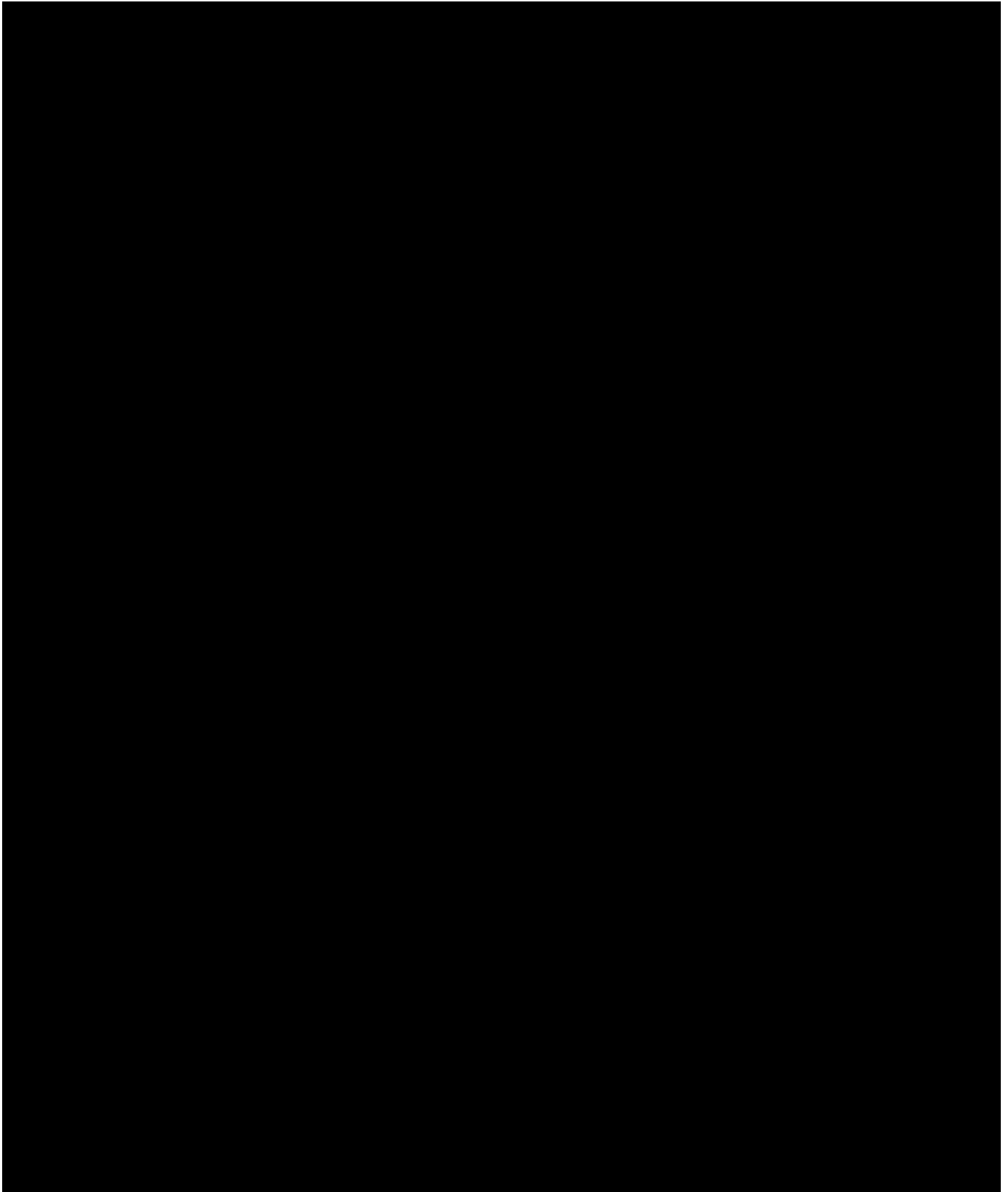


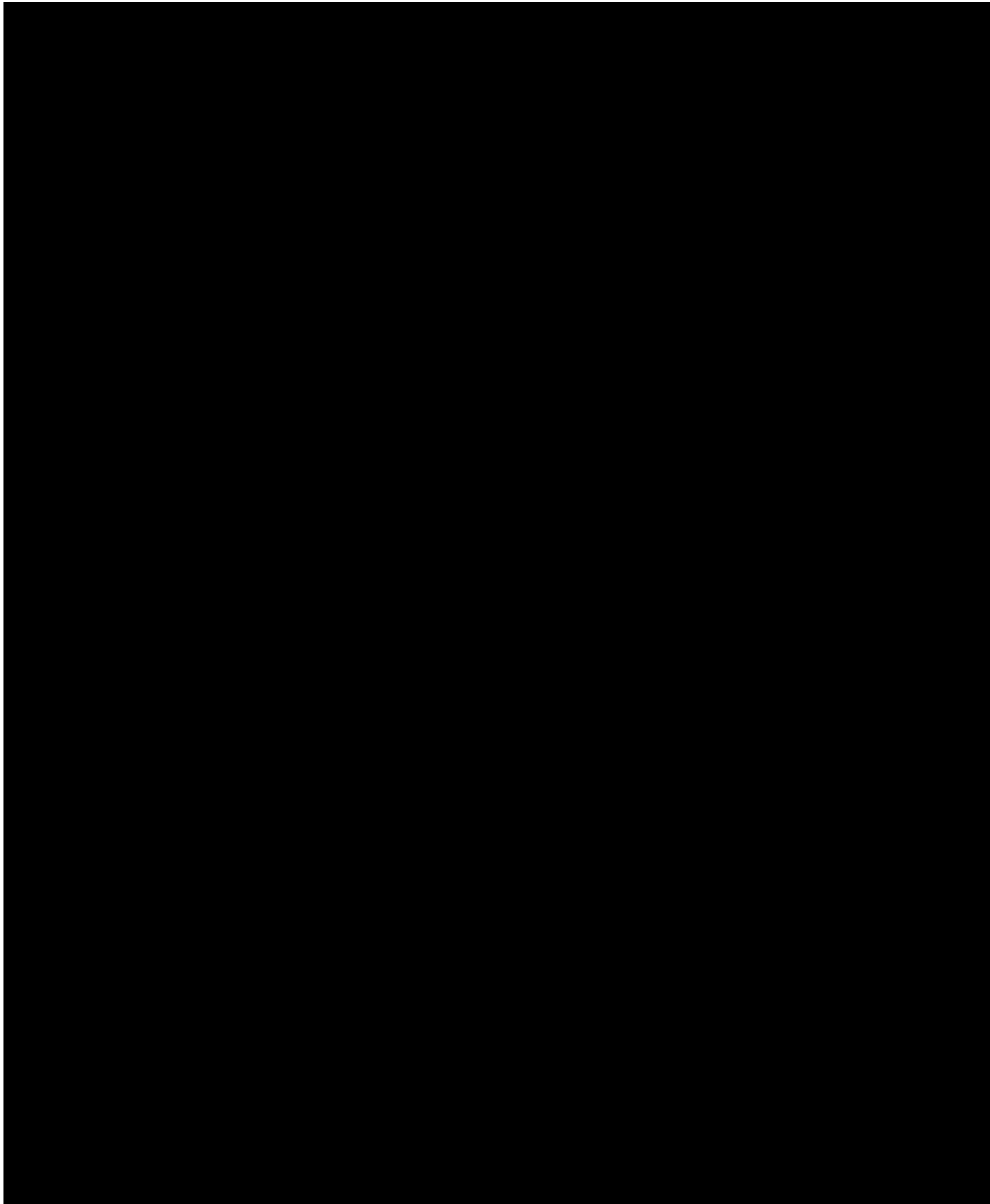
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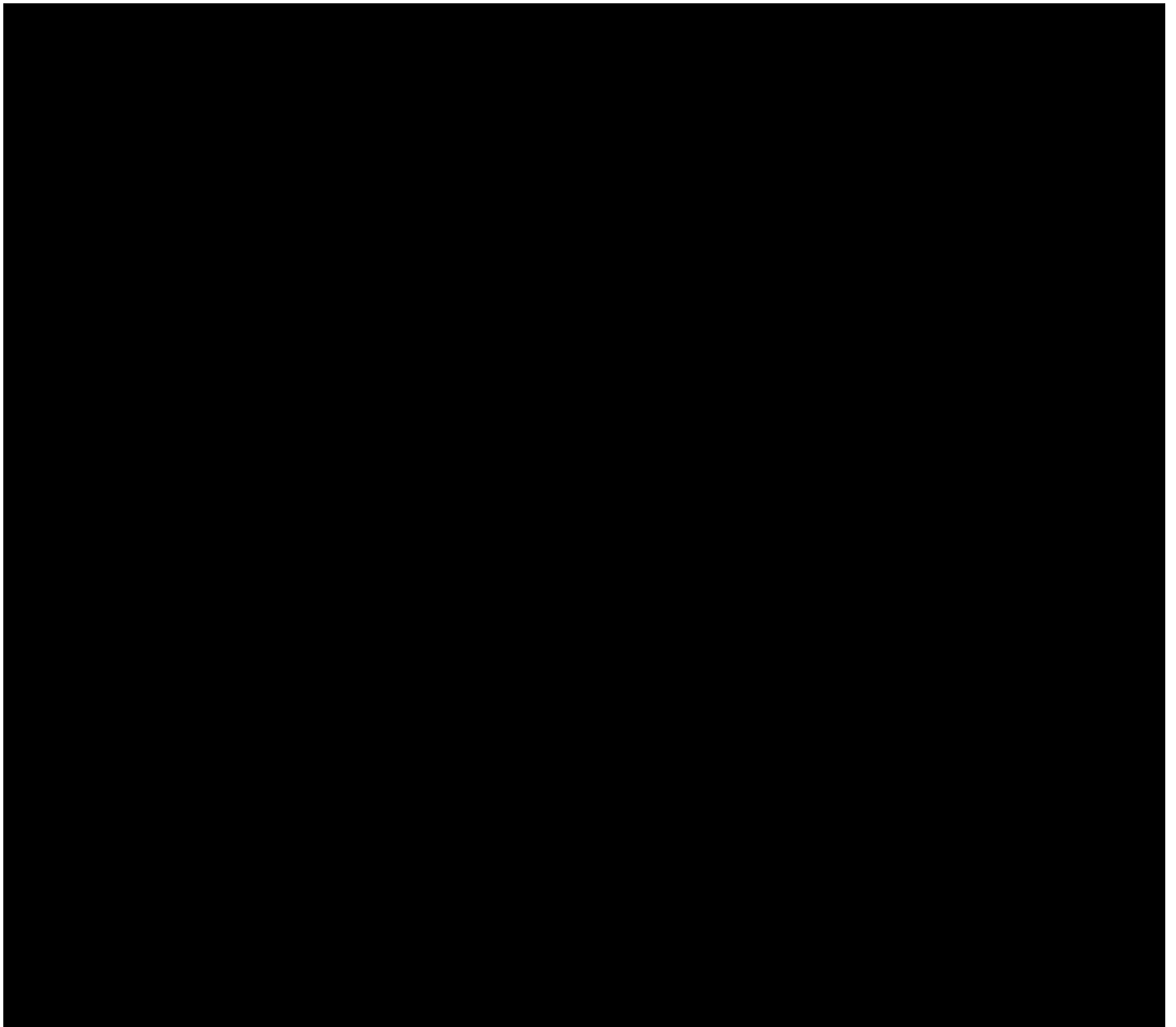


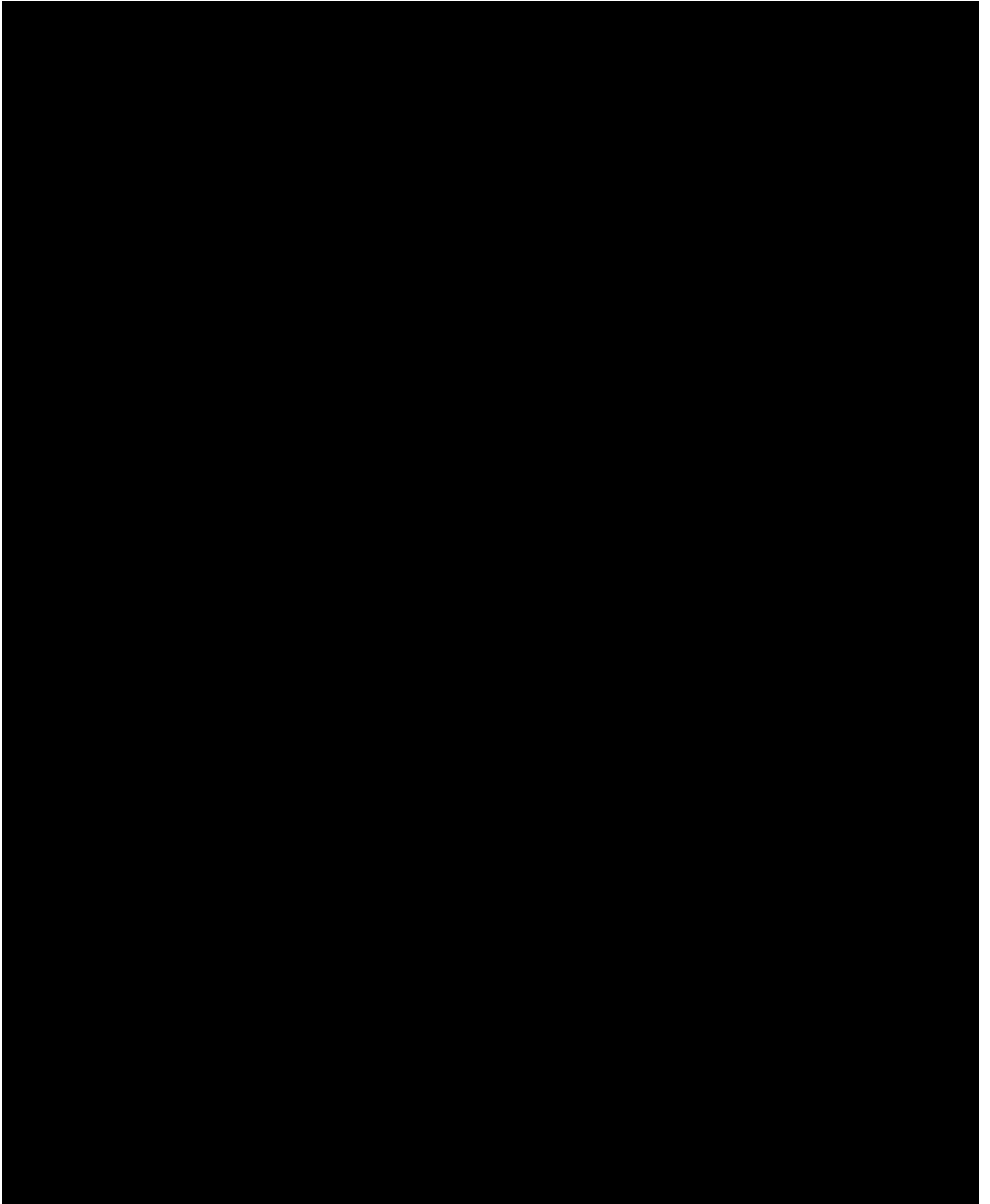


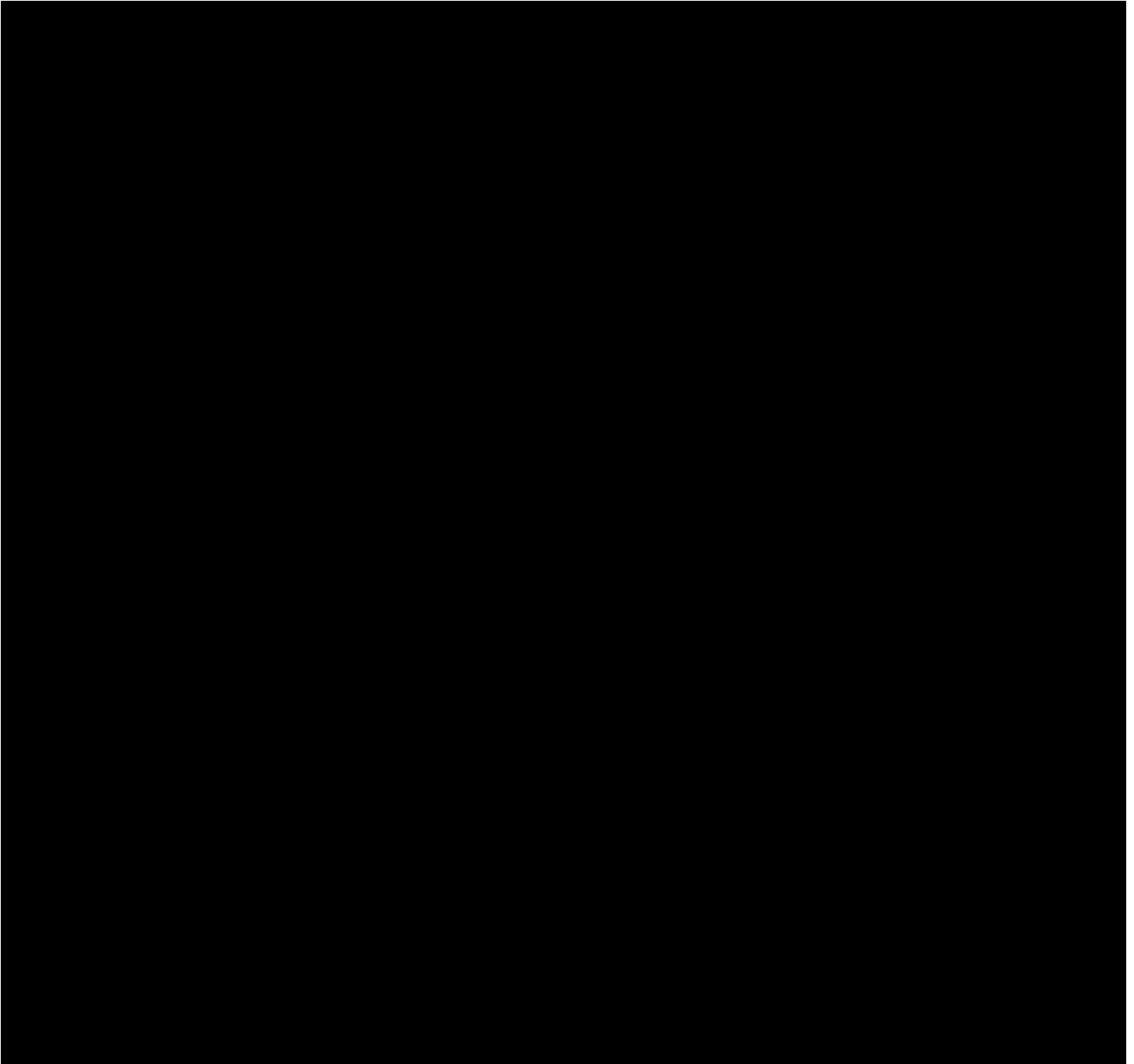


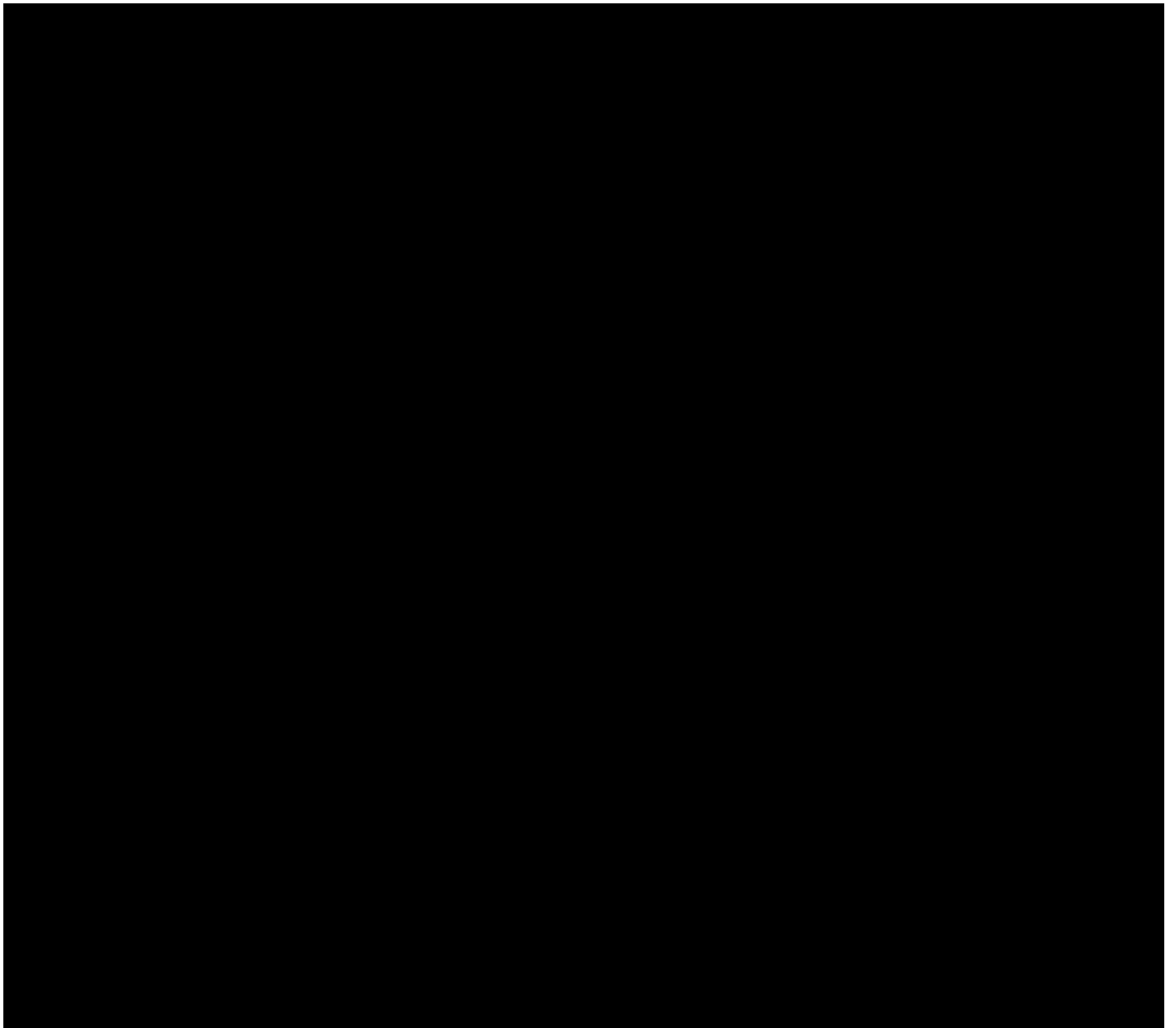
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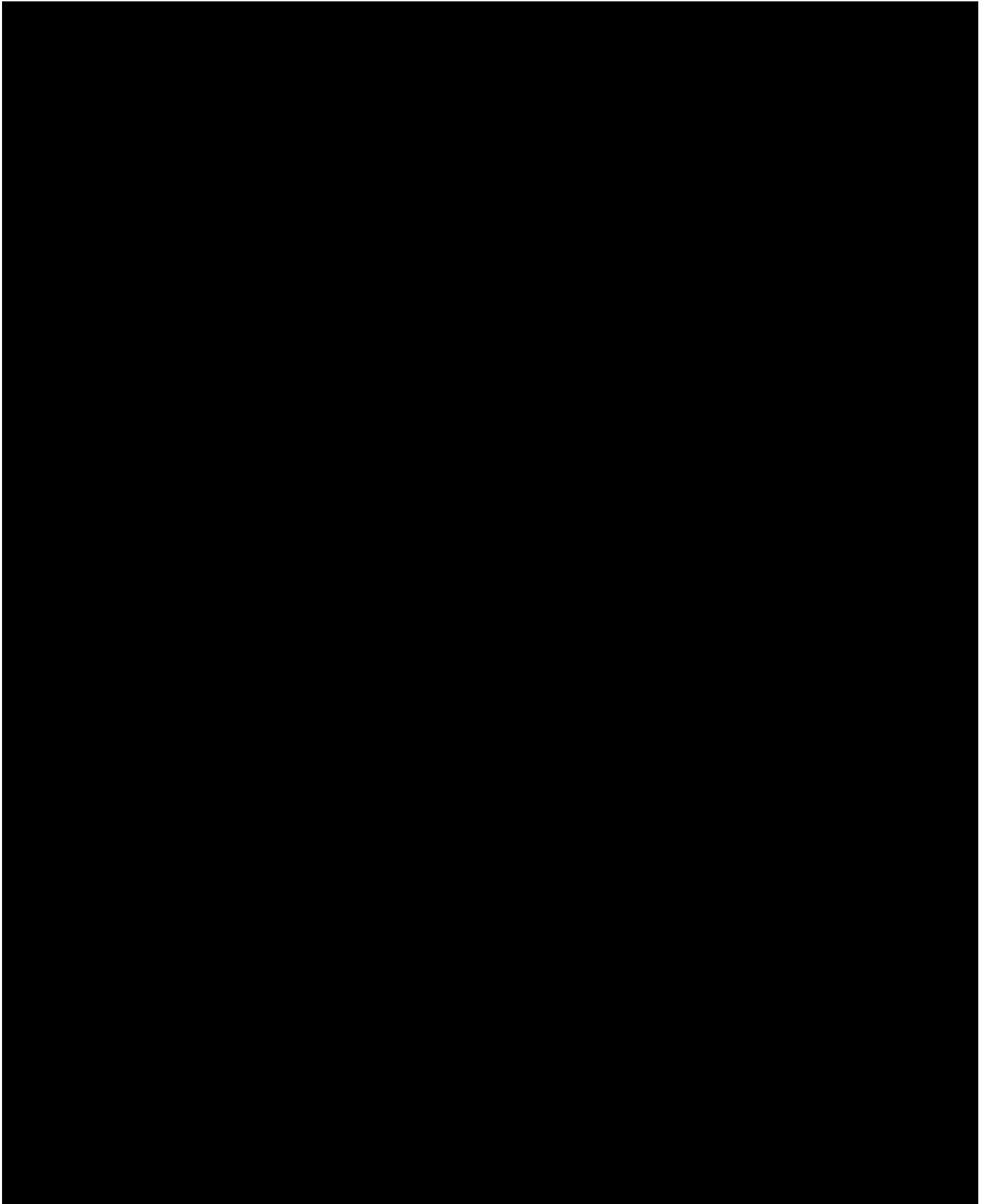
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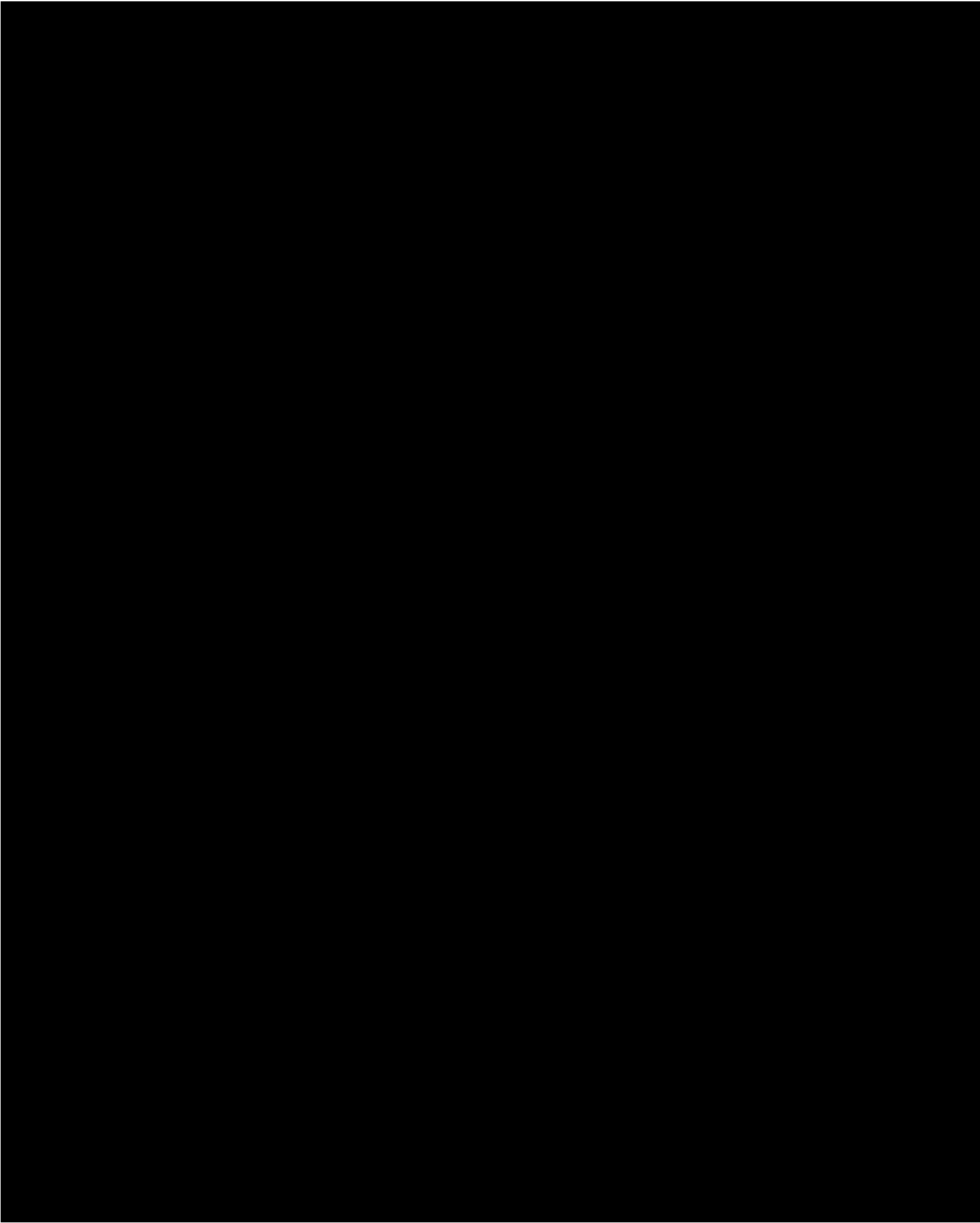
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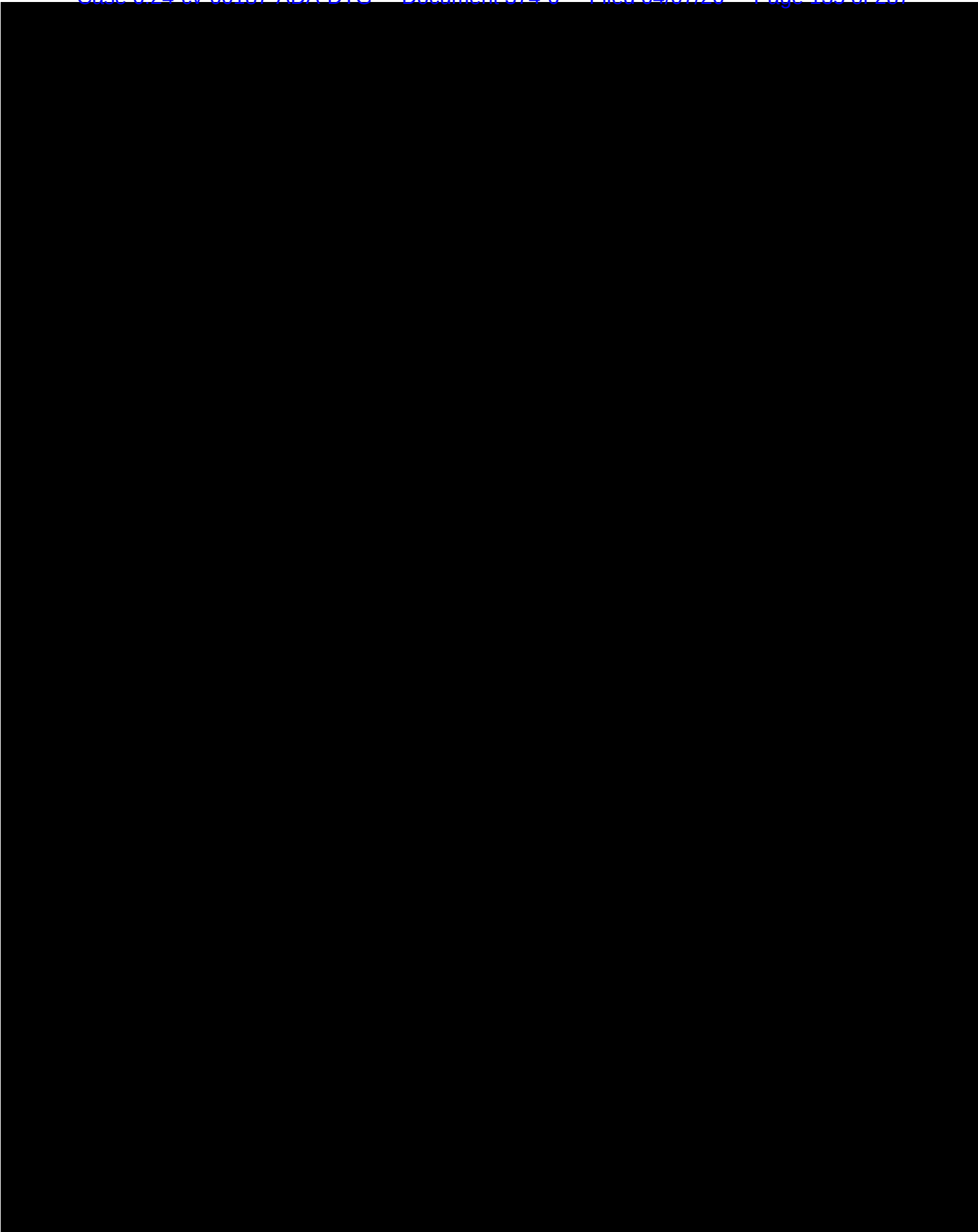
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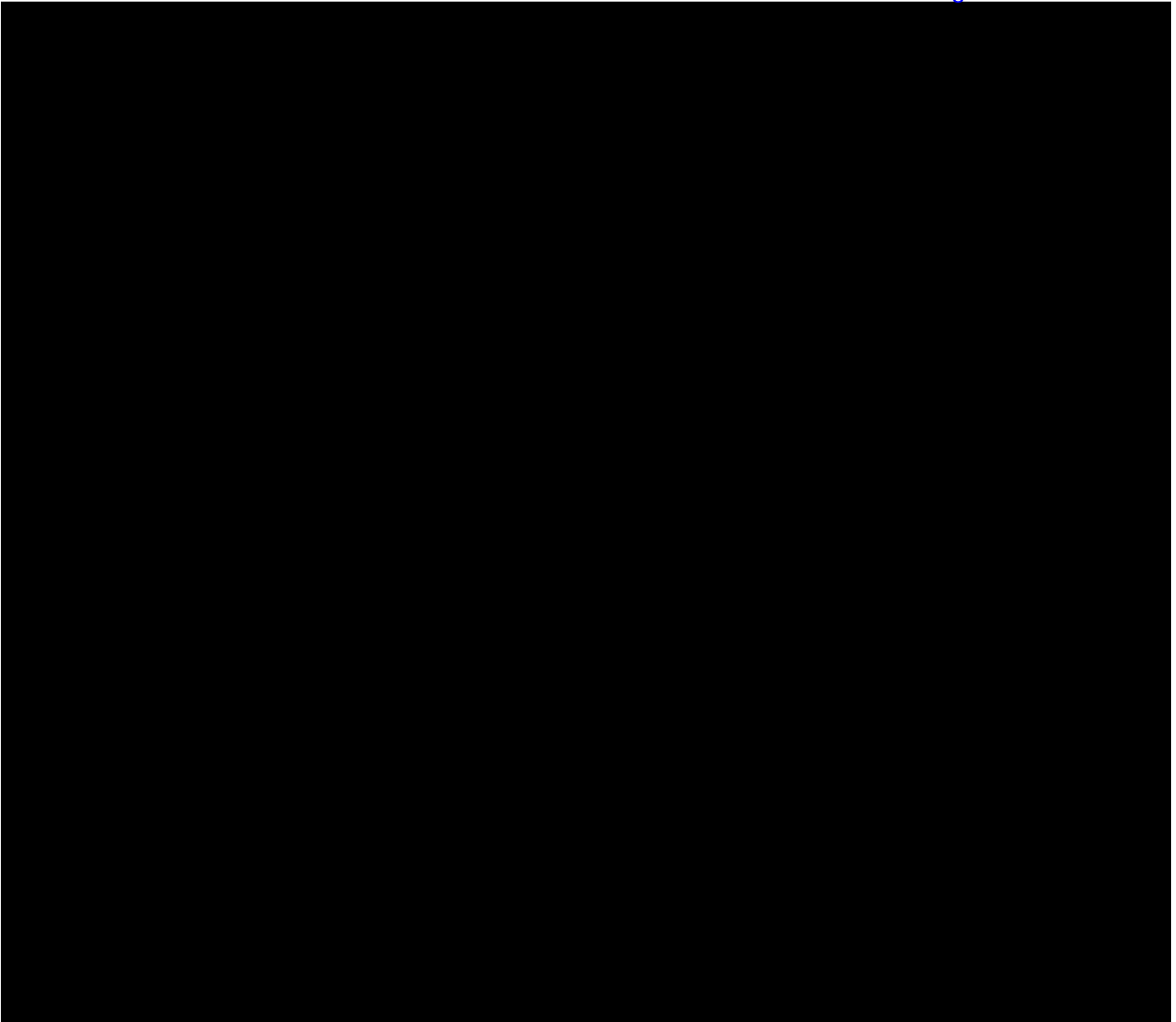
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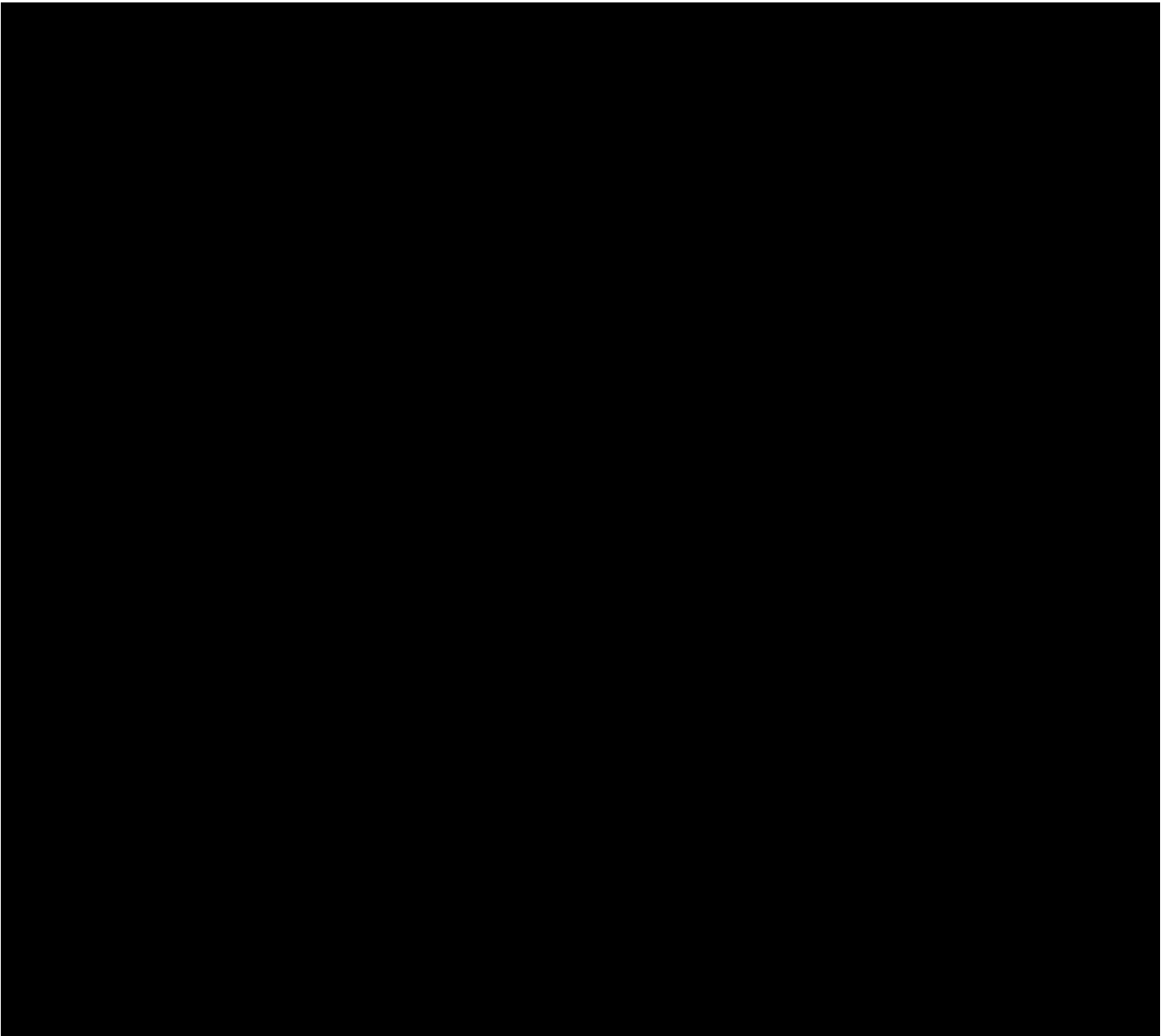
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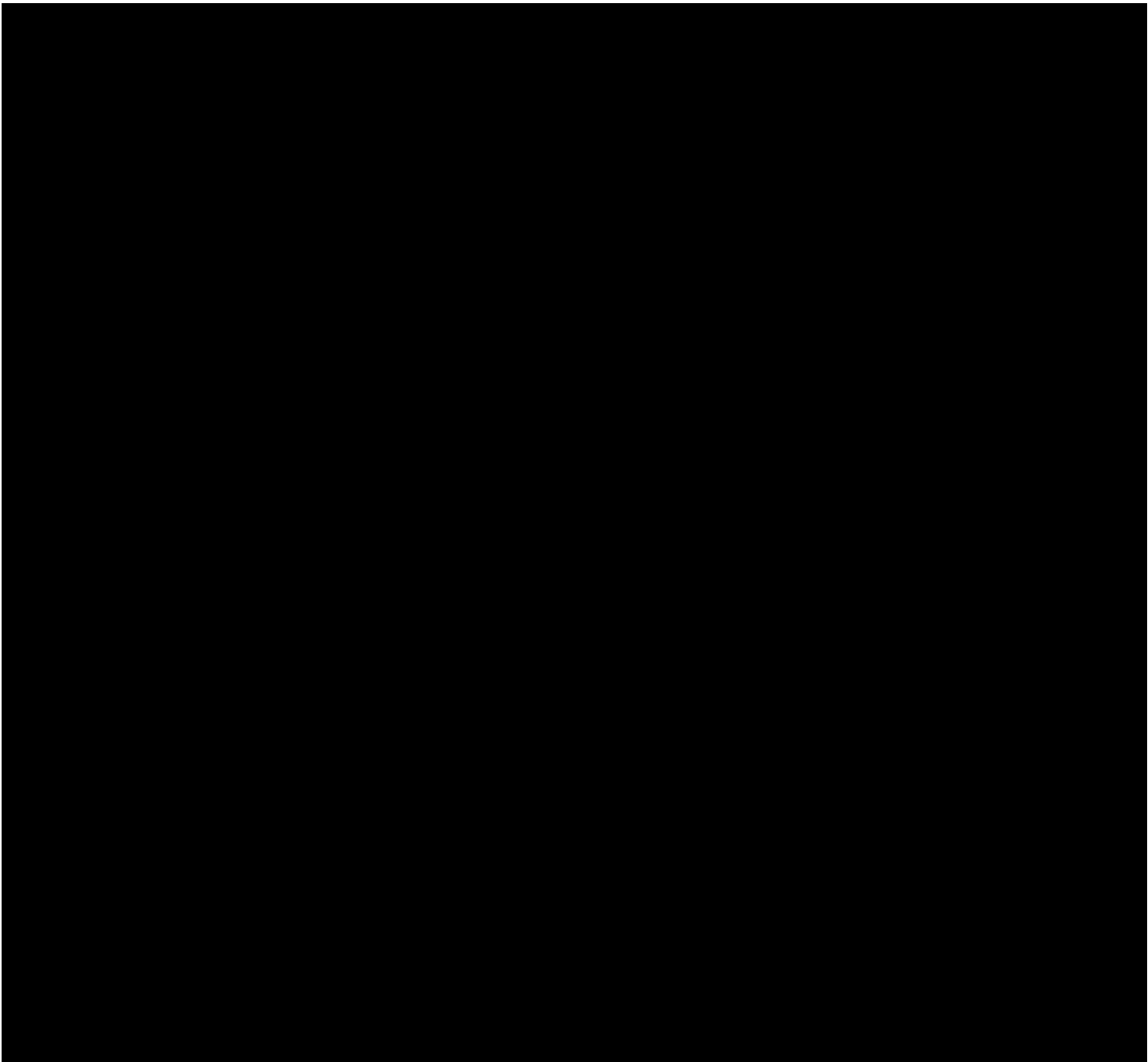
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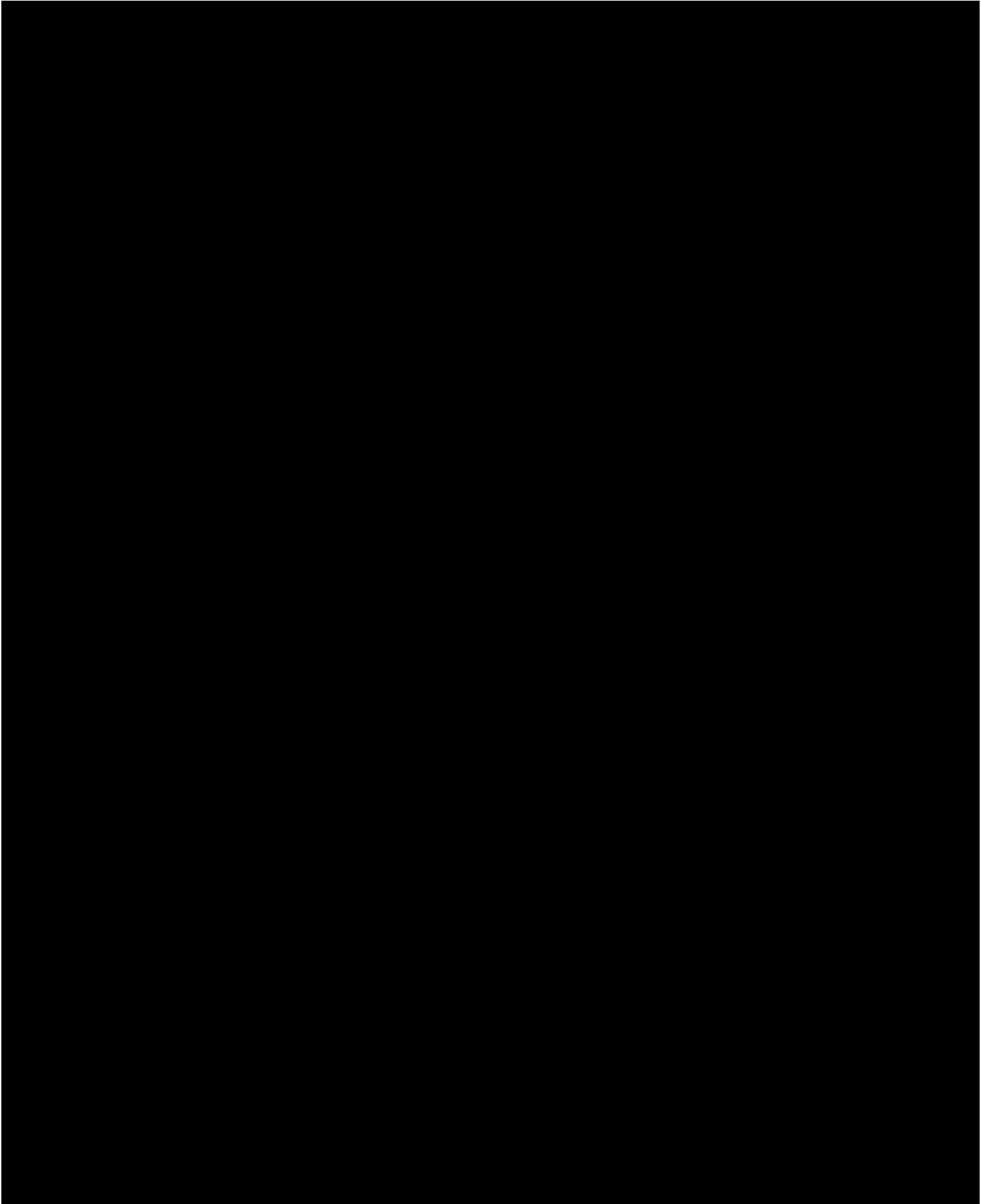


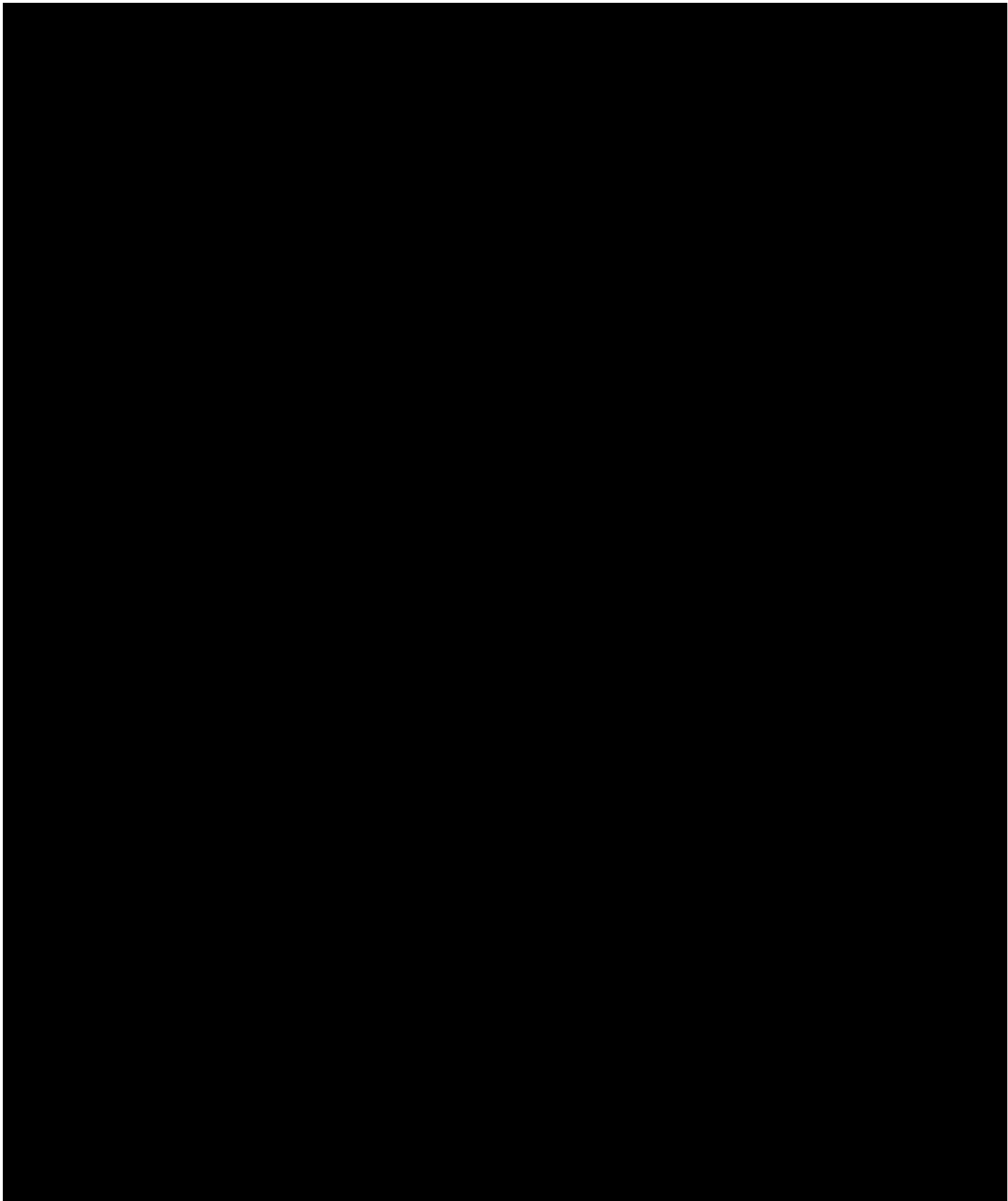


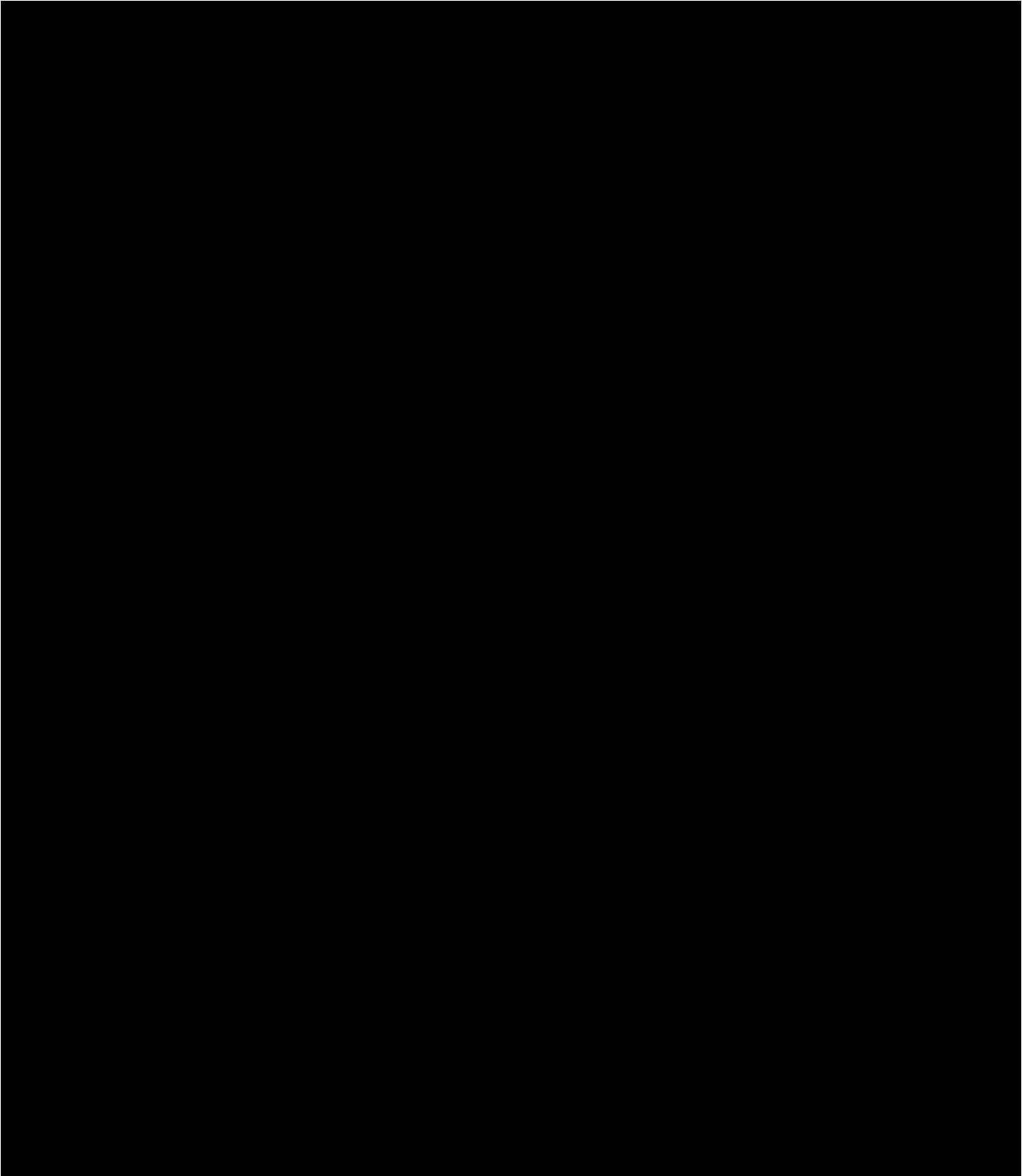




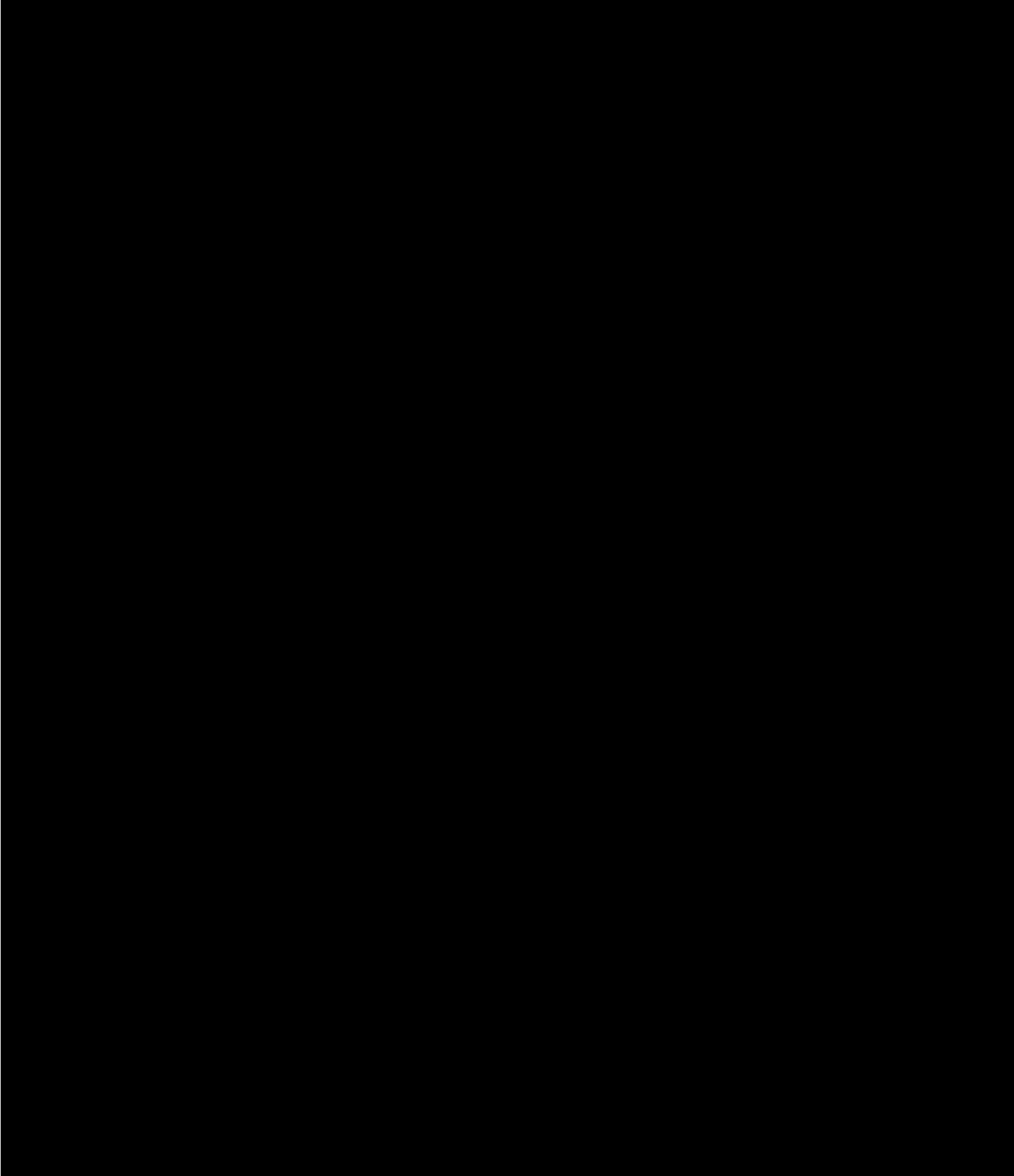


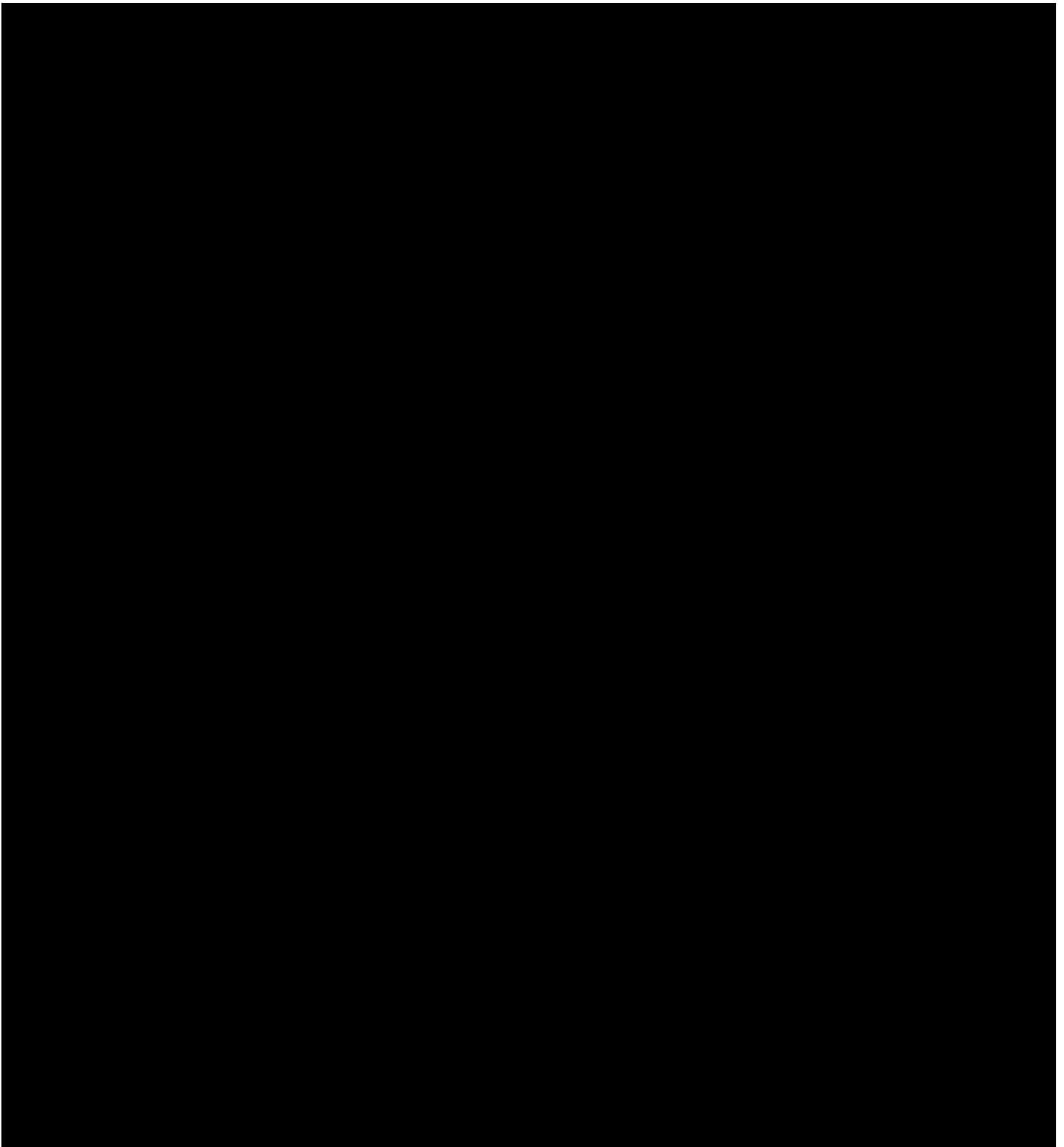






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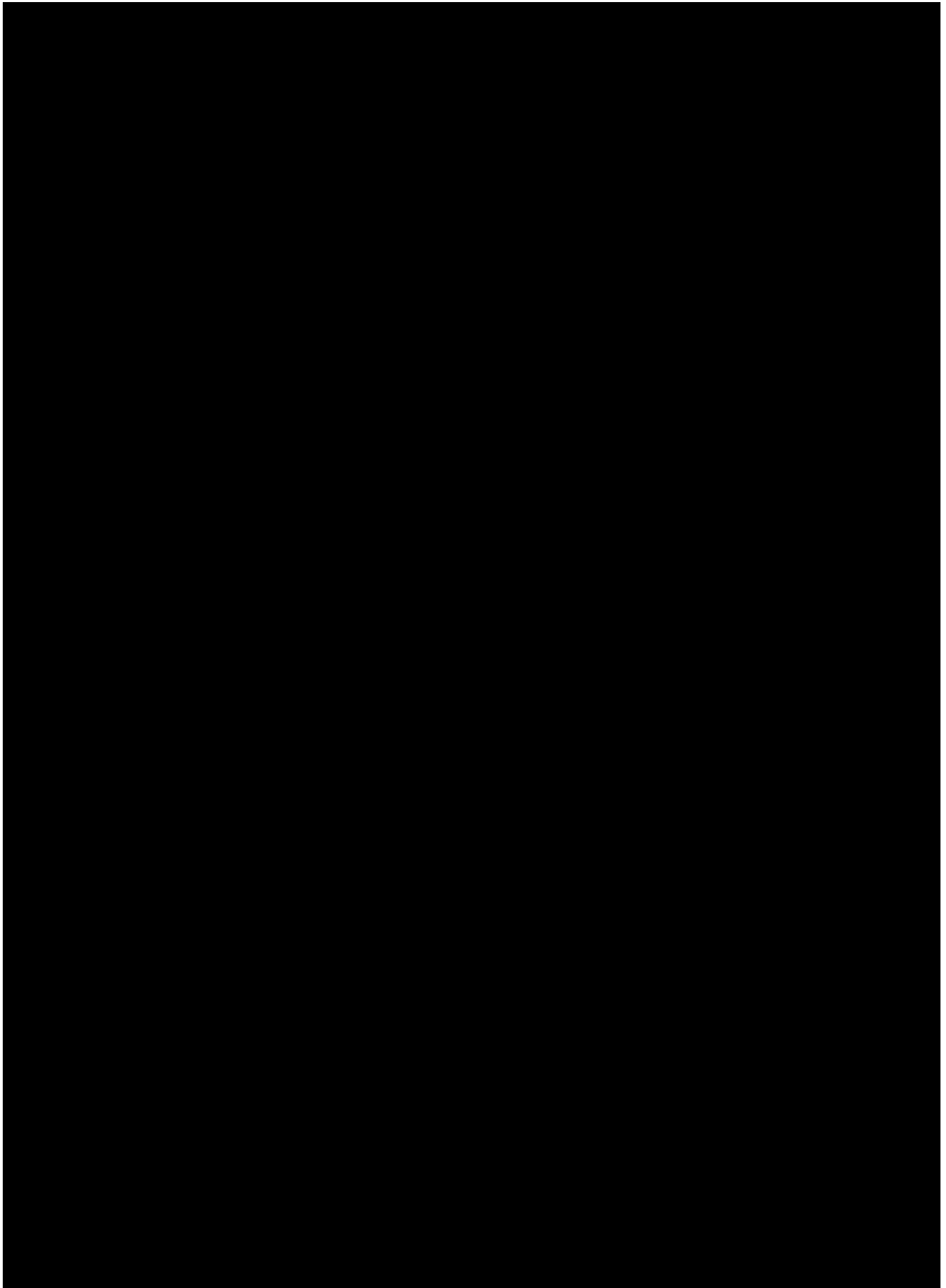
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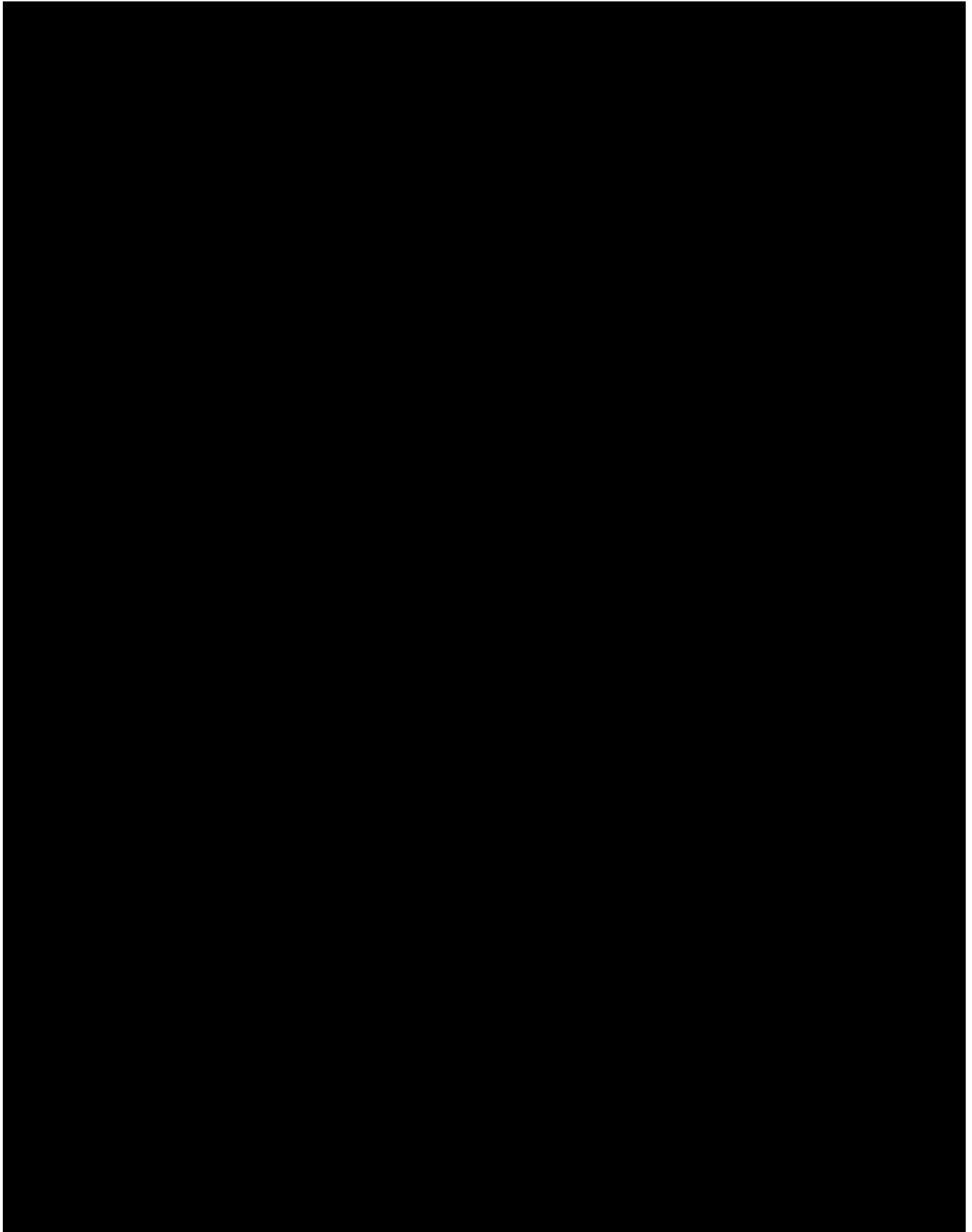
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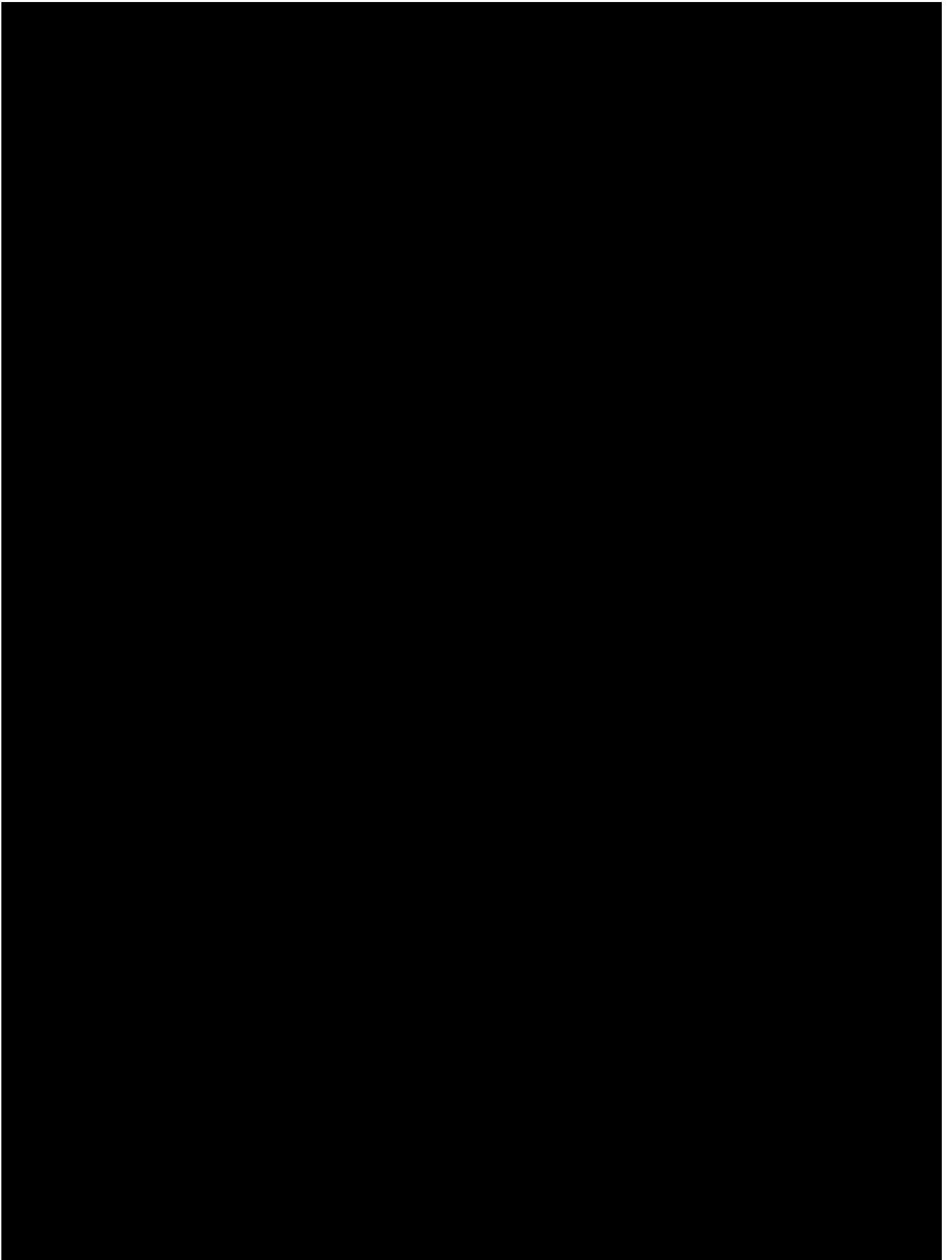
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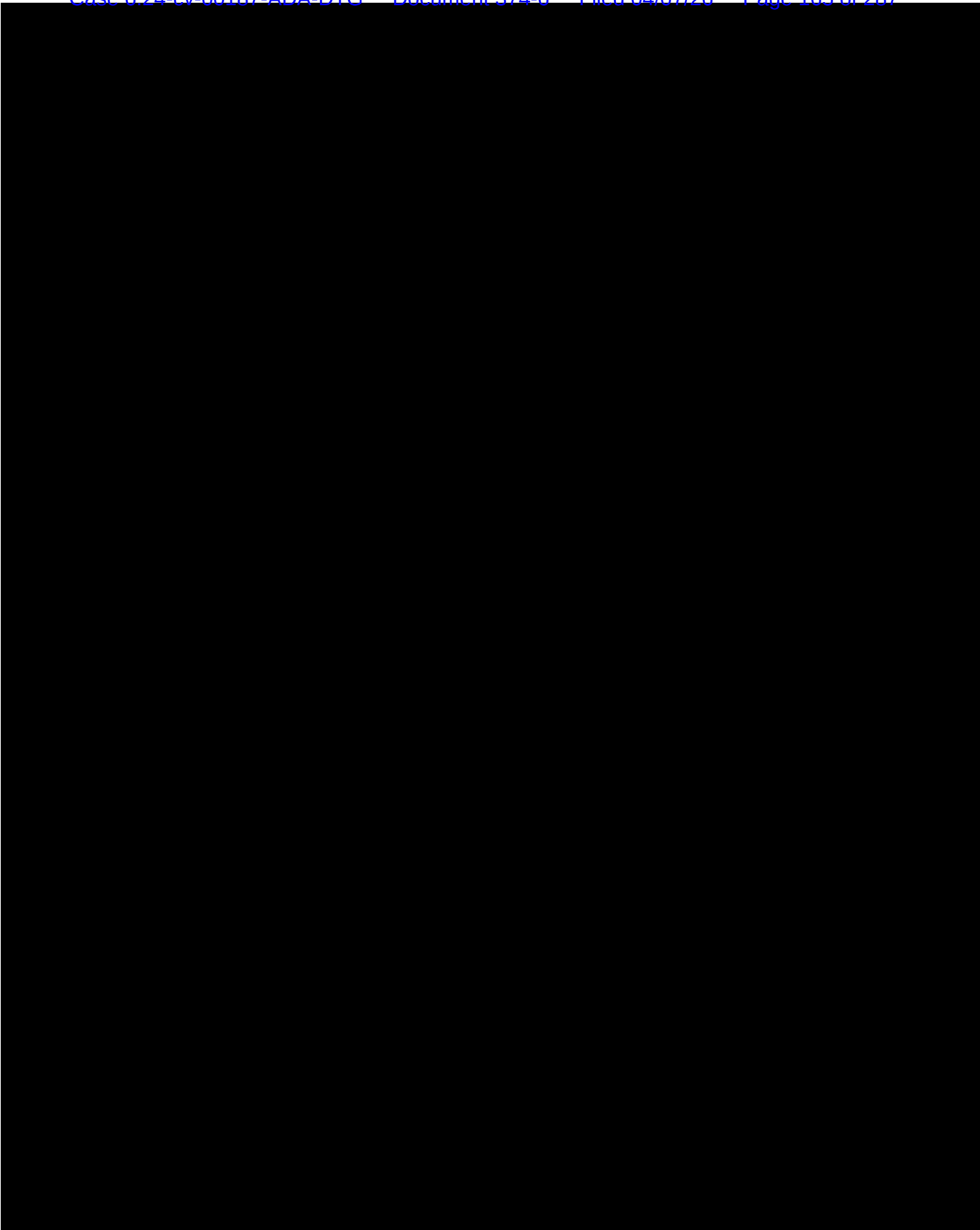


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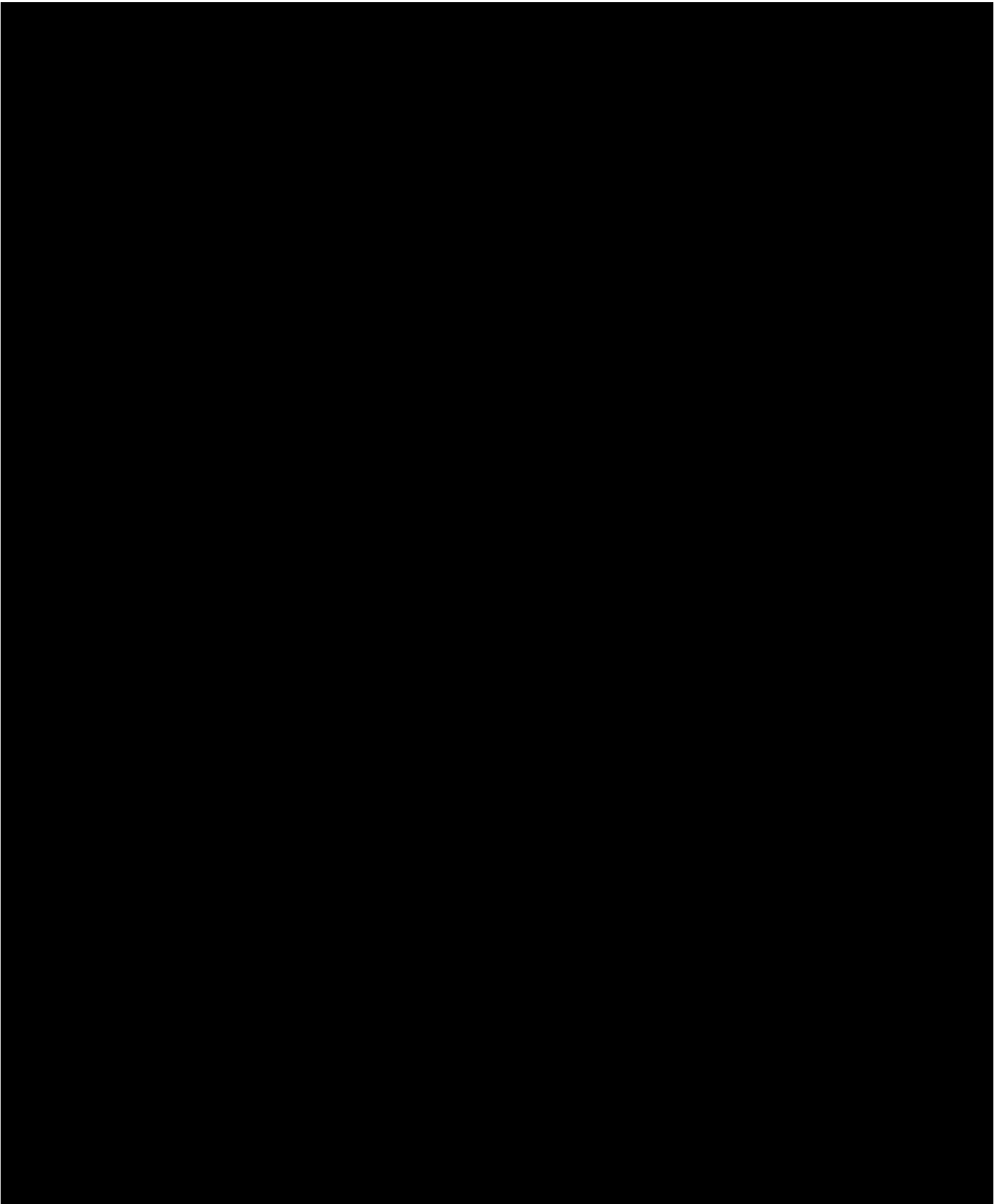
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A horizontal bar chart consisting of 20 black bars of varying lengths. The bars are arranged vertically, with the longest bar at the top and the shortest bar at the bottom. The lengths vary significantly, with some bars being nearly full-width and others being very short. The bars are arranged in a single column, with the longest bar at the top and the shortest bar at the bottom. The lengths vary significantly, with some bars being nearly full-width and others being very short.

[illegible]



Bar Index	Relative Length (approximate percentage of the longest bar)
1	95%
2	65%
3	98%
4	68%
5	92%
6	96%
7	100%
8	88%
9	10%
10	100%
11	10%
12	85%
13	100%
14	100%
15	100%
16	100%
17	60%
18	90%
19	75%
20	95%
21	70%



A series of 20 horizontal black bars of varying lengths, representing a list of redacted items. The bars are arranged vertically, with the first bar being the longest and the last bar being the shortest. The lengths of the bars vary significantly, with some being nearly full-width and others being much shorter.

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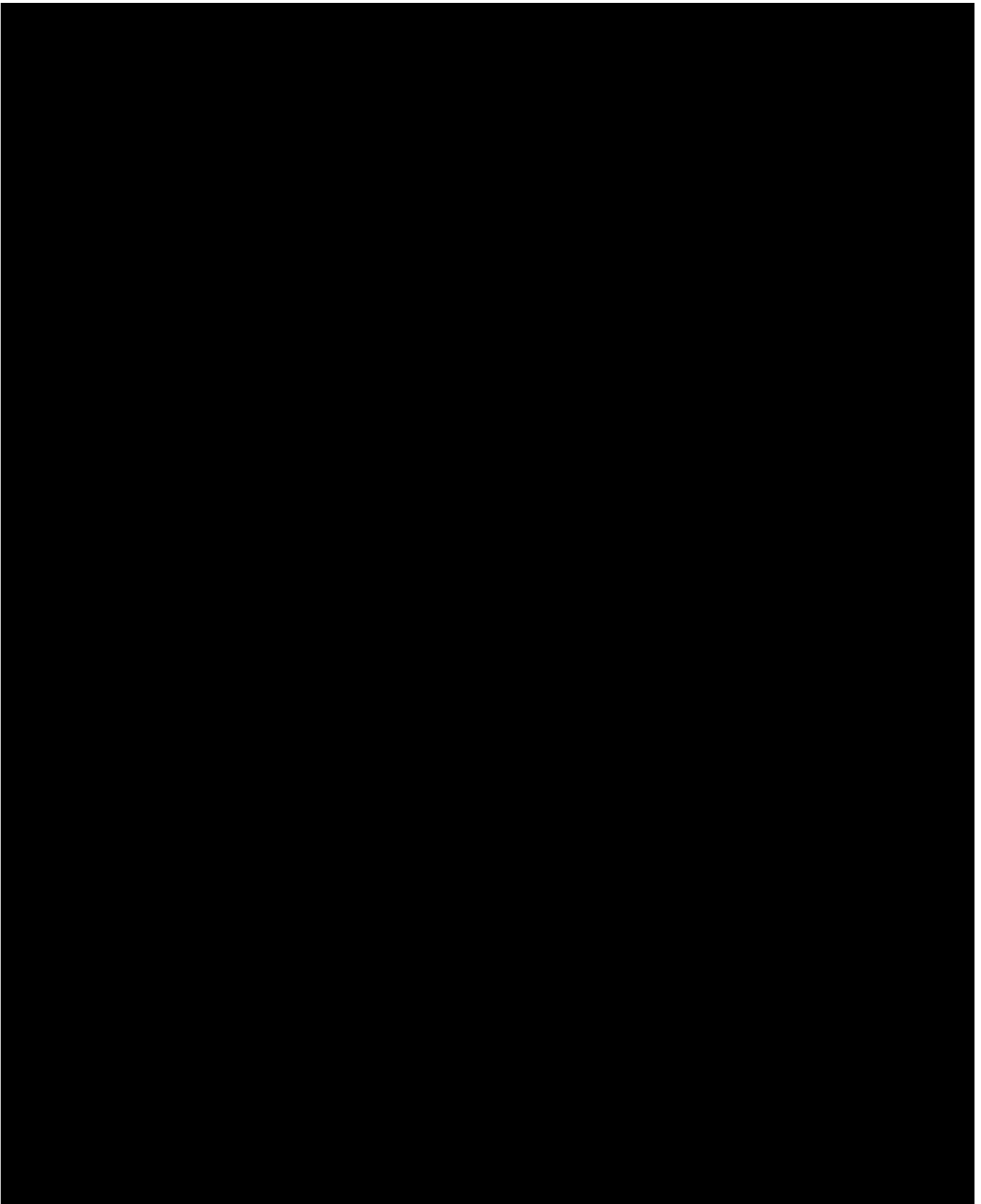
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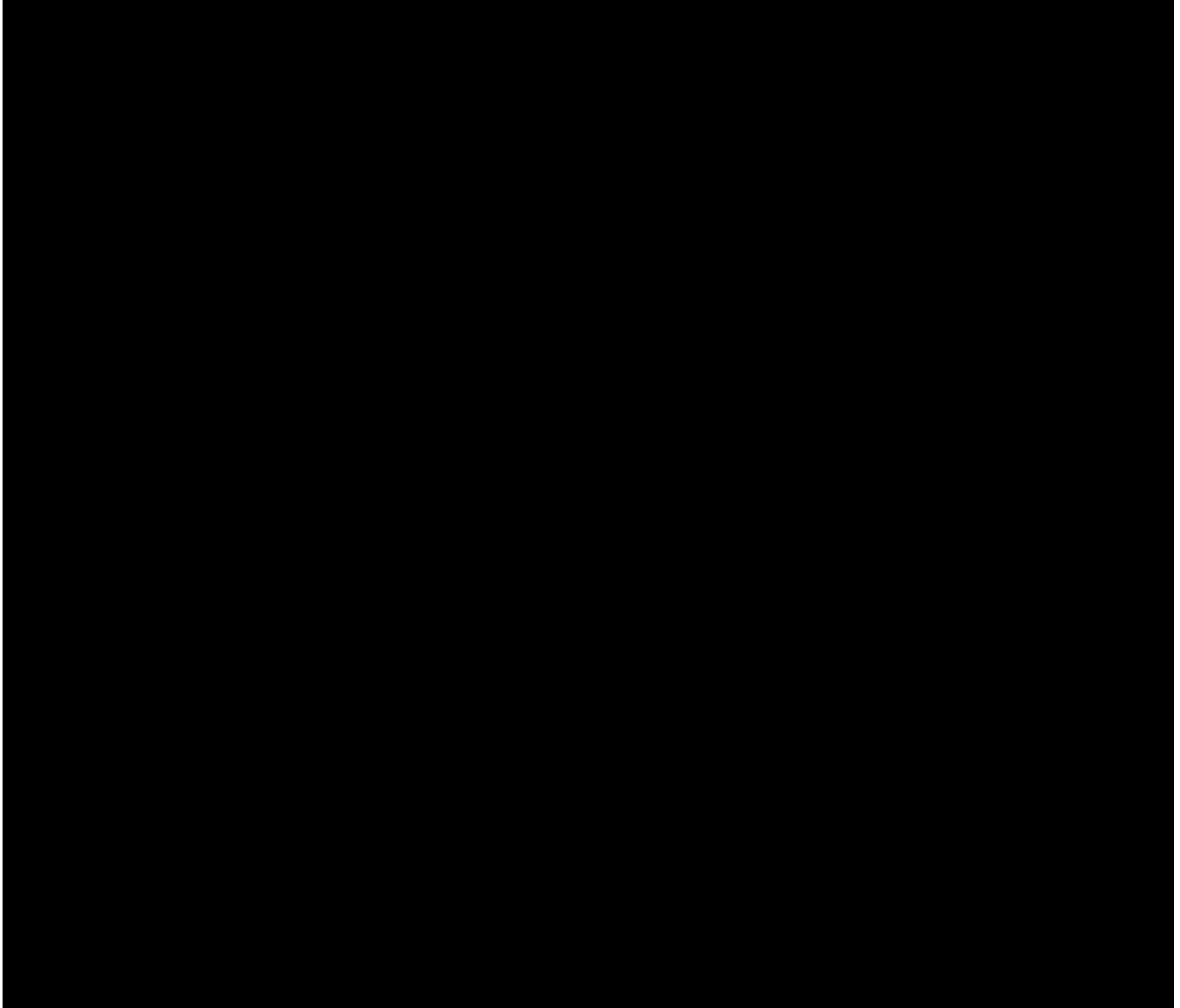
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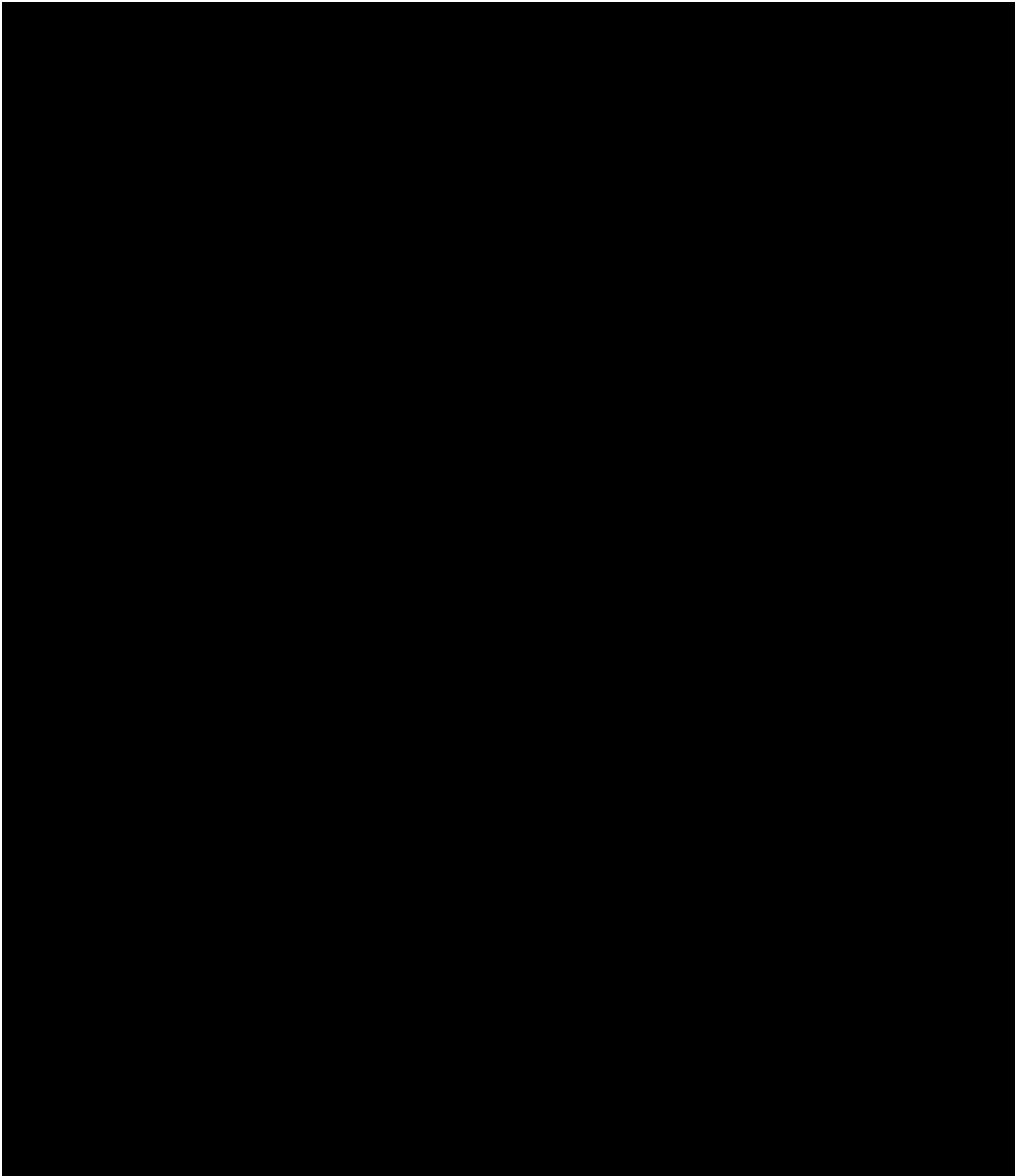
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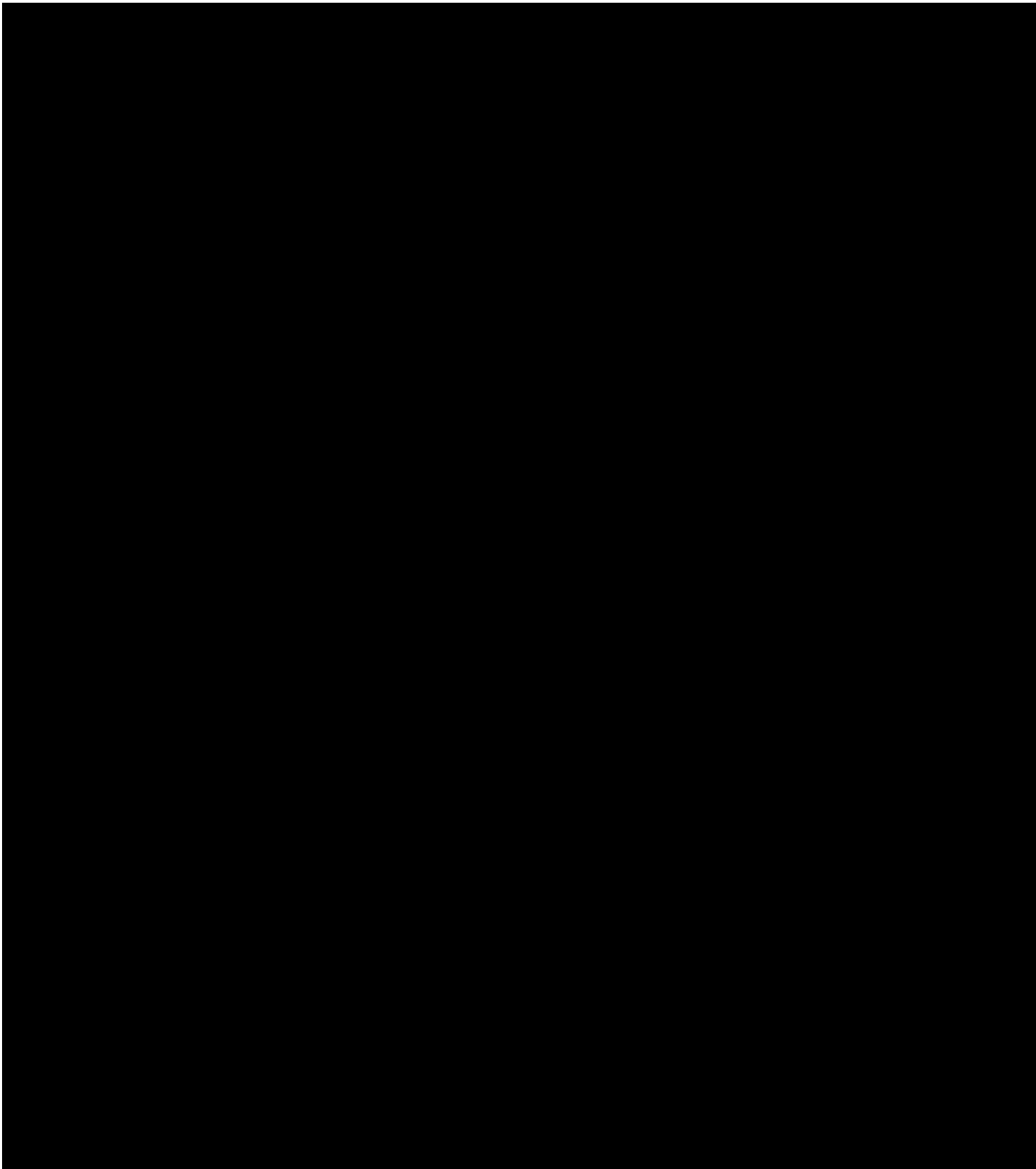
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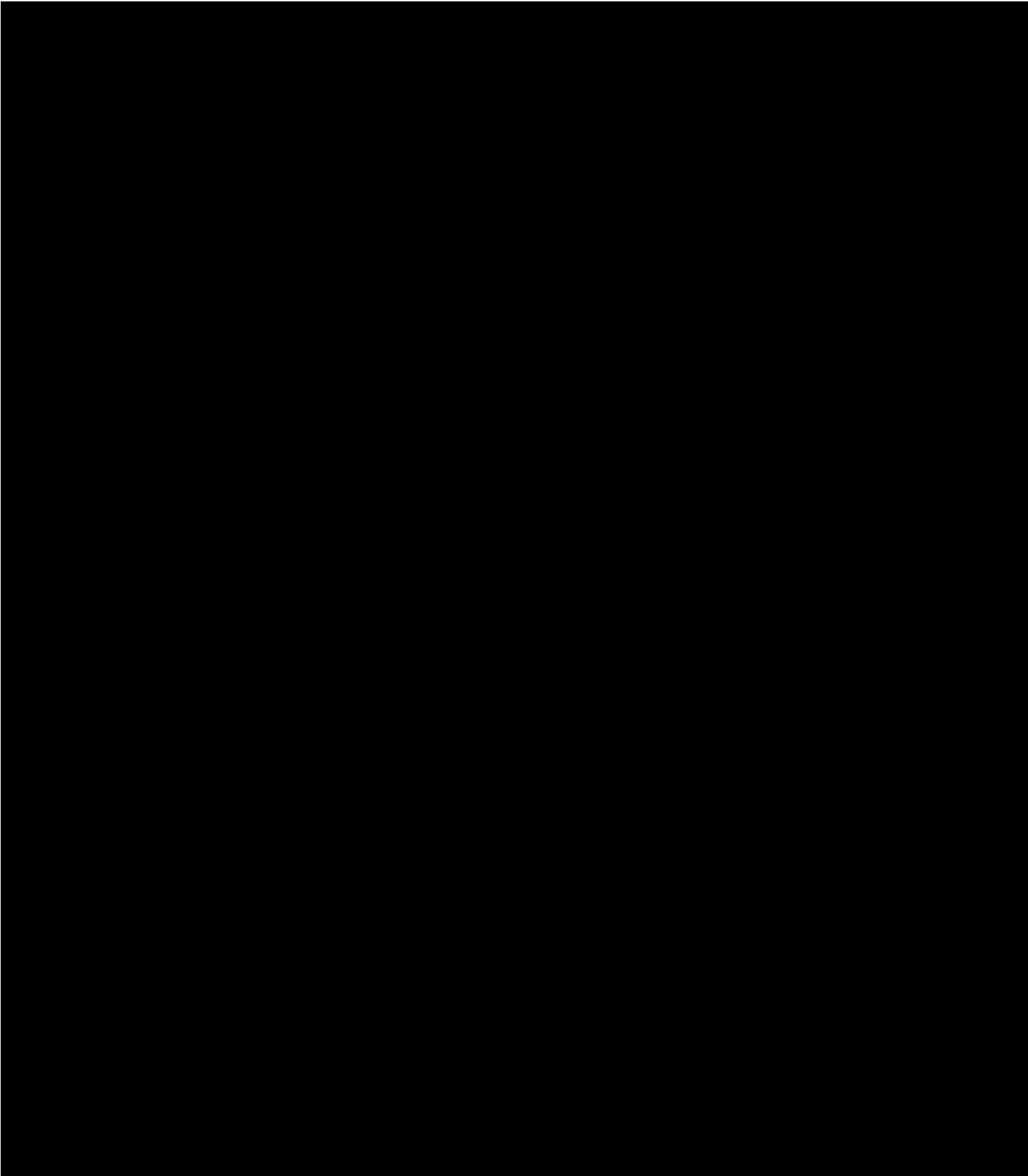
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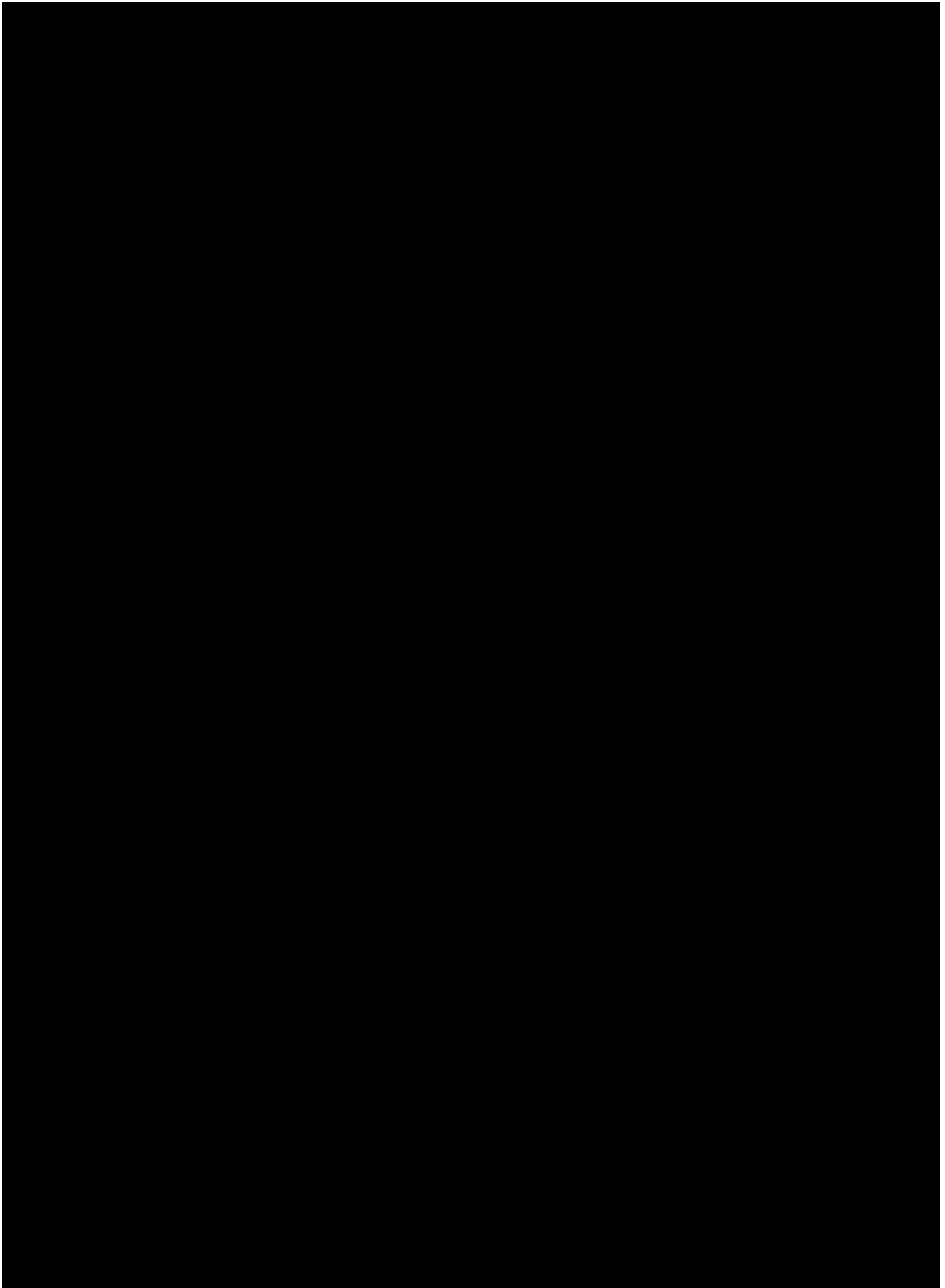
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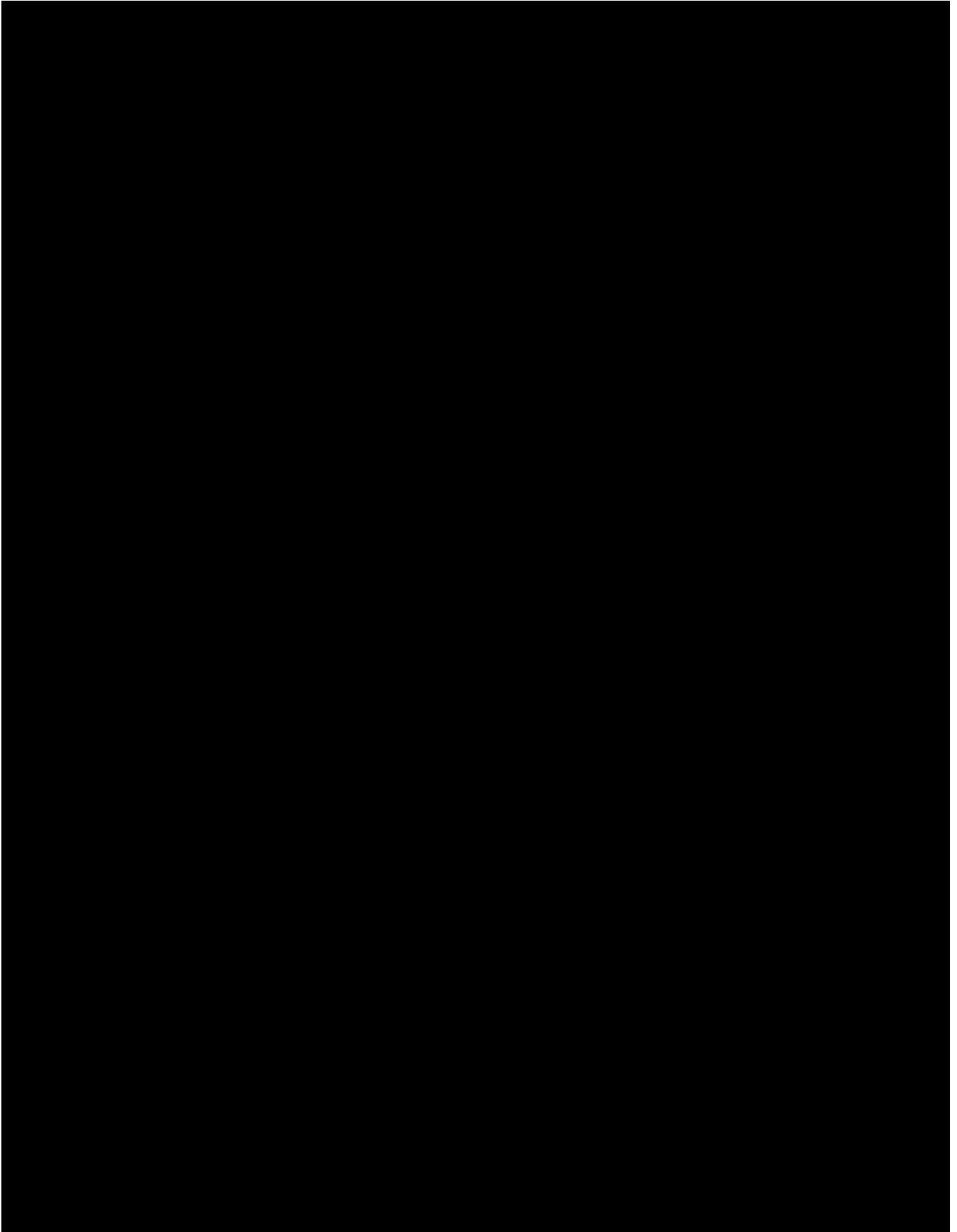


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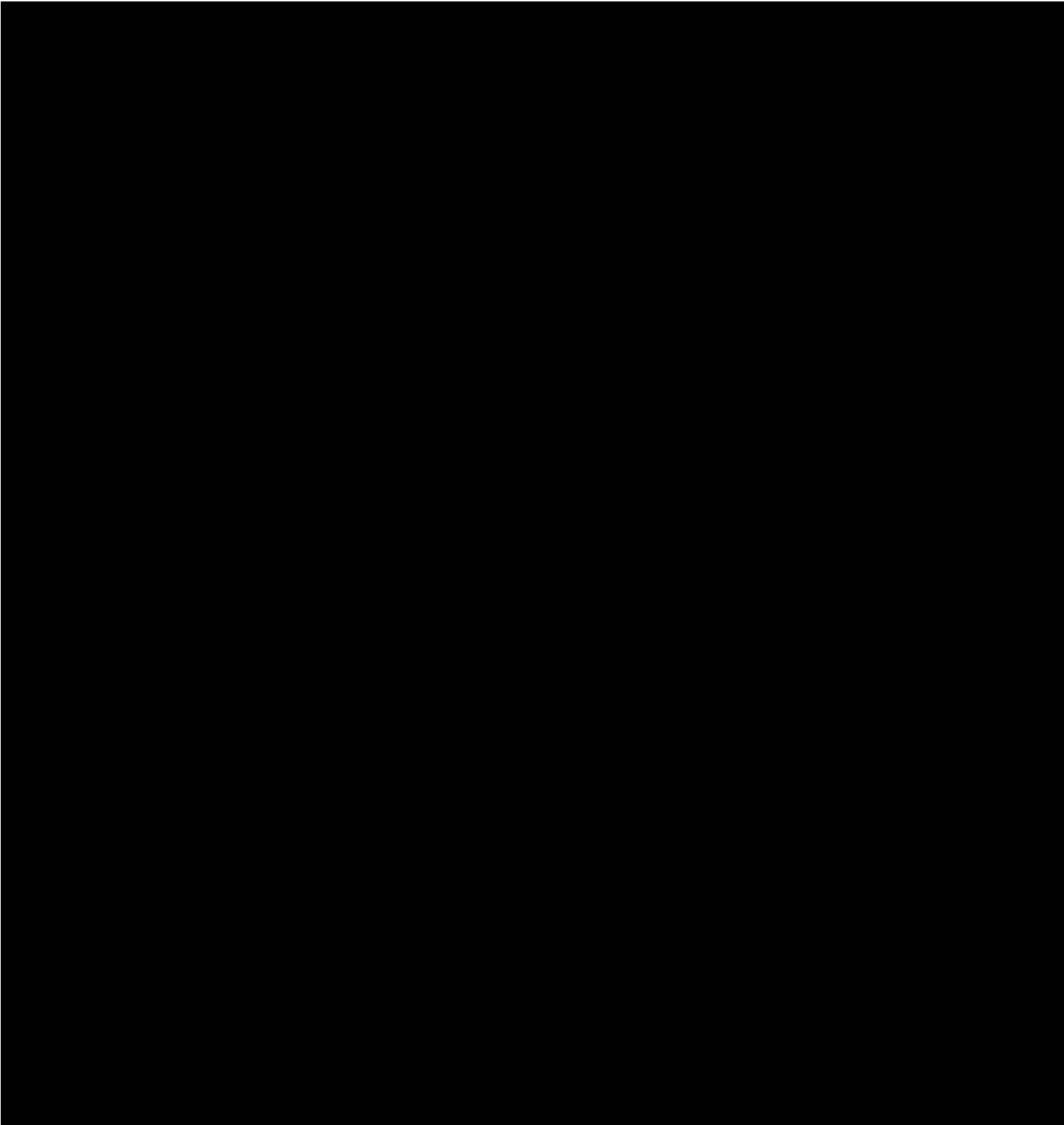
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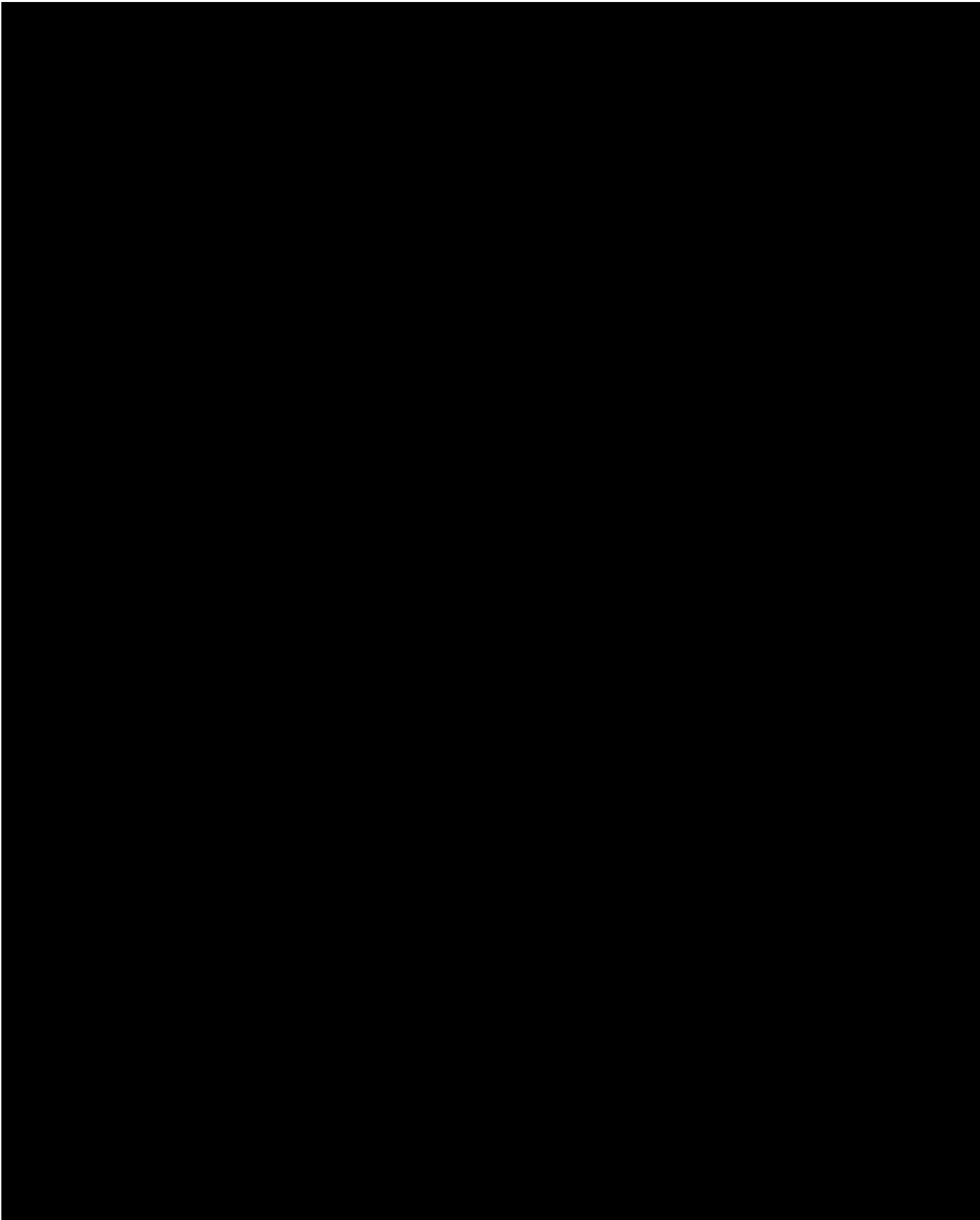
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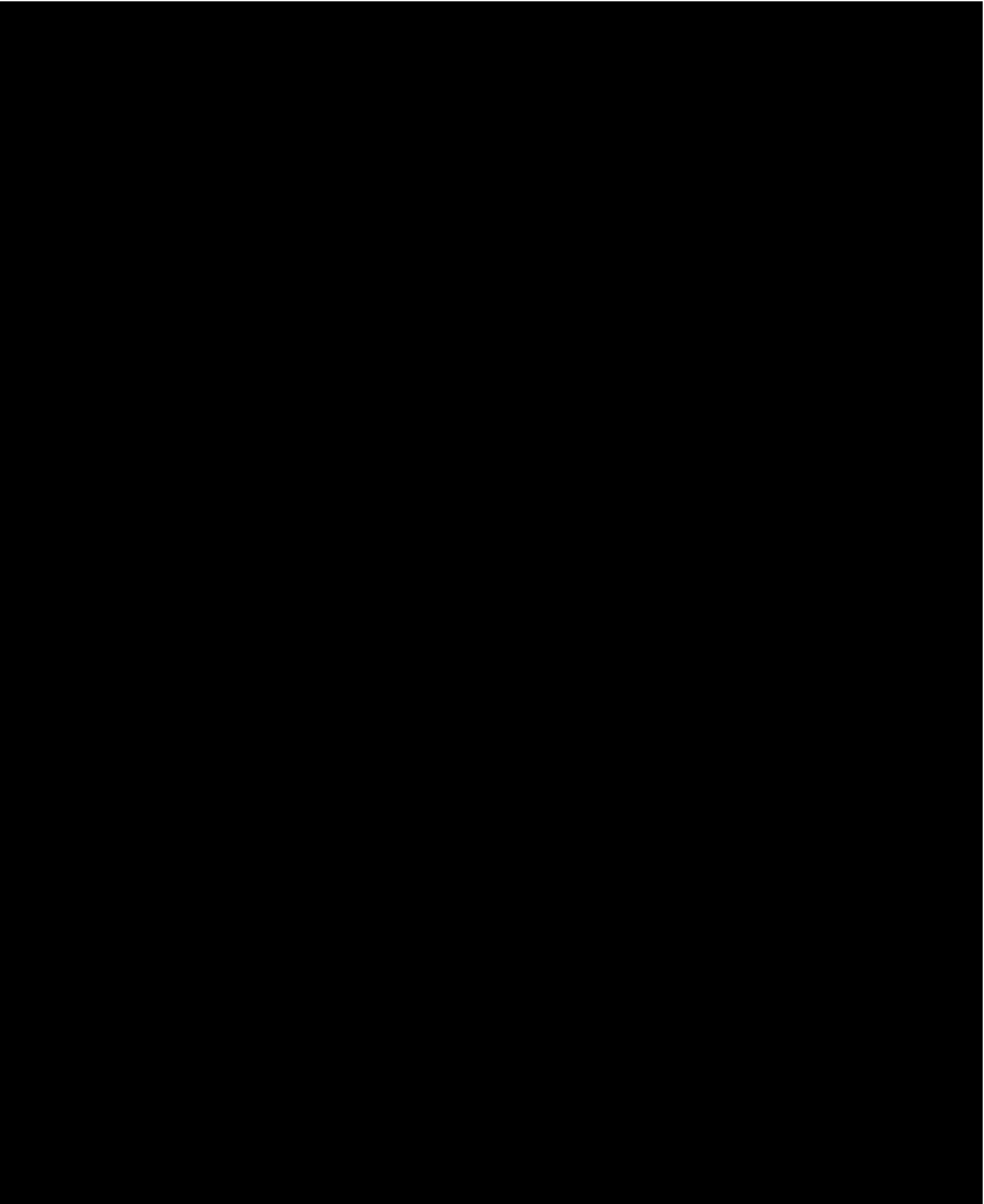


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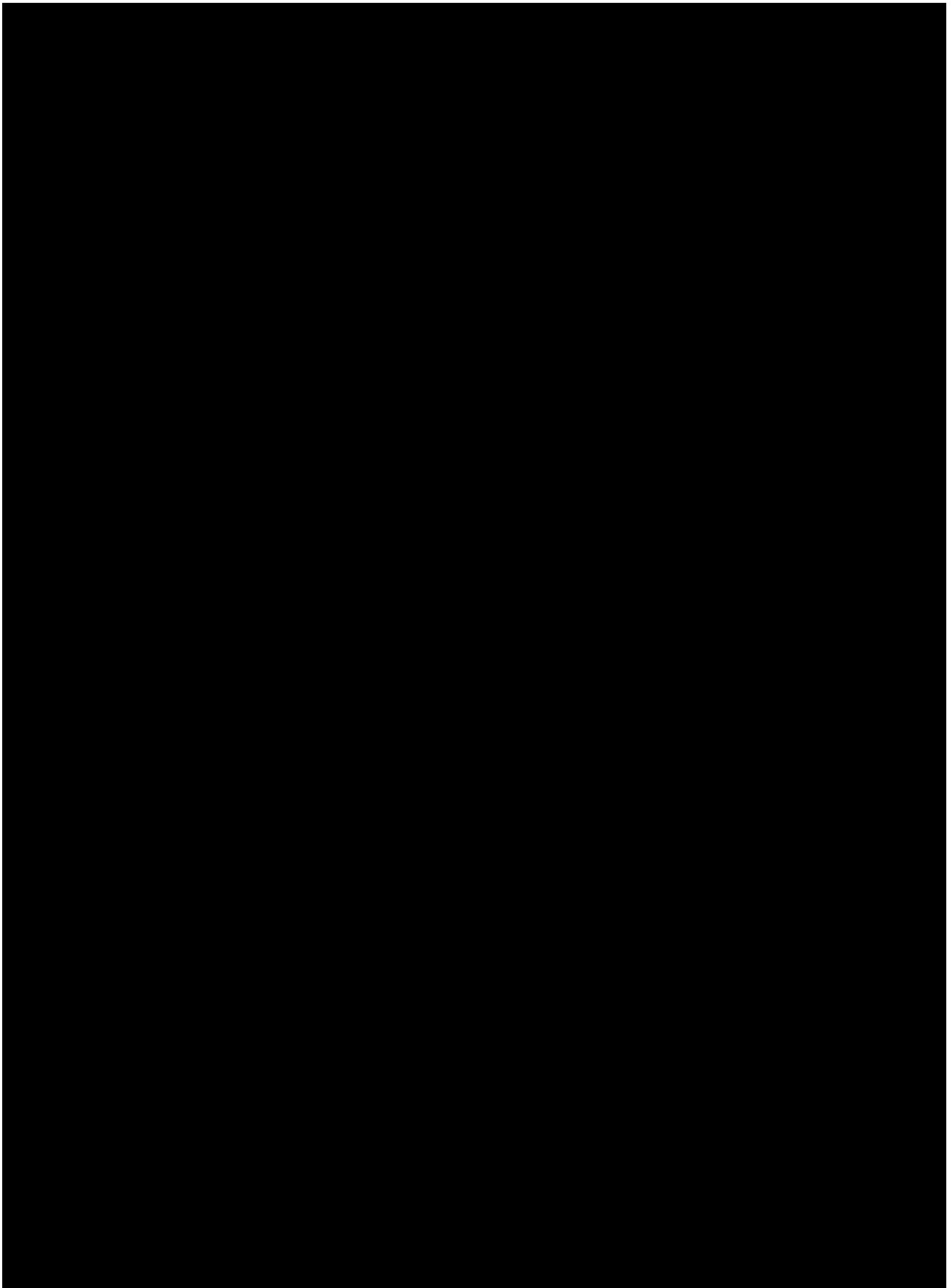
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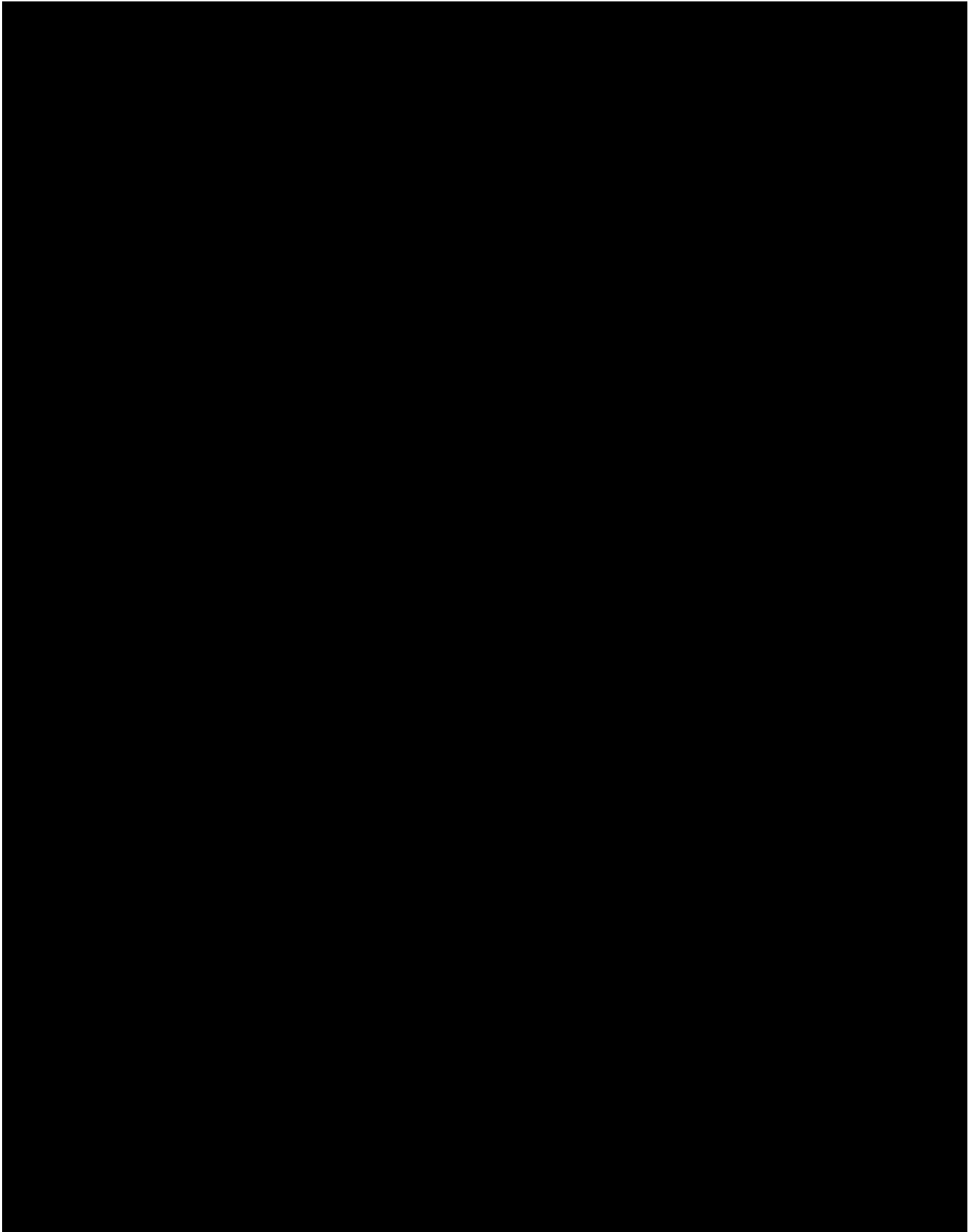
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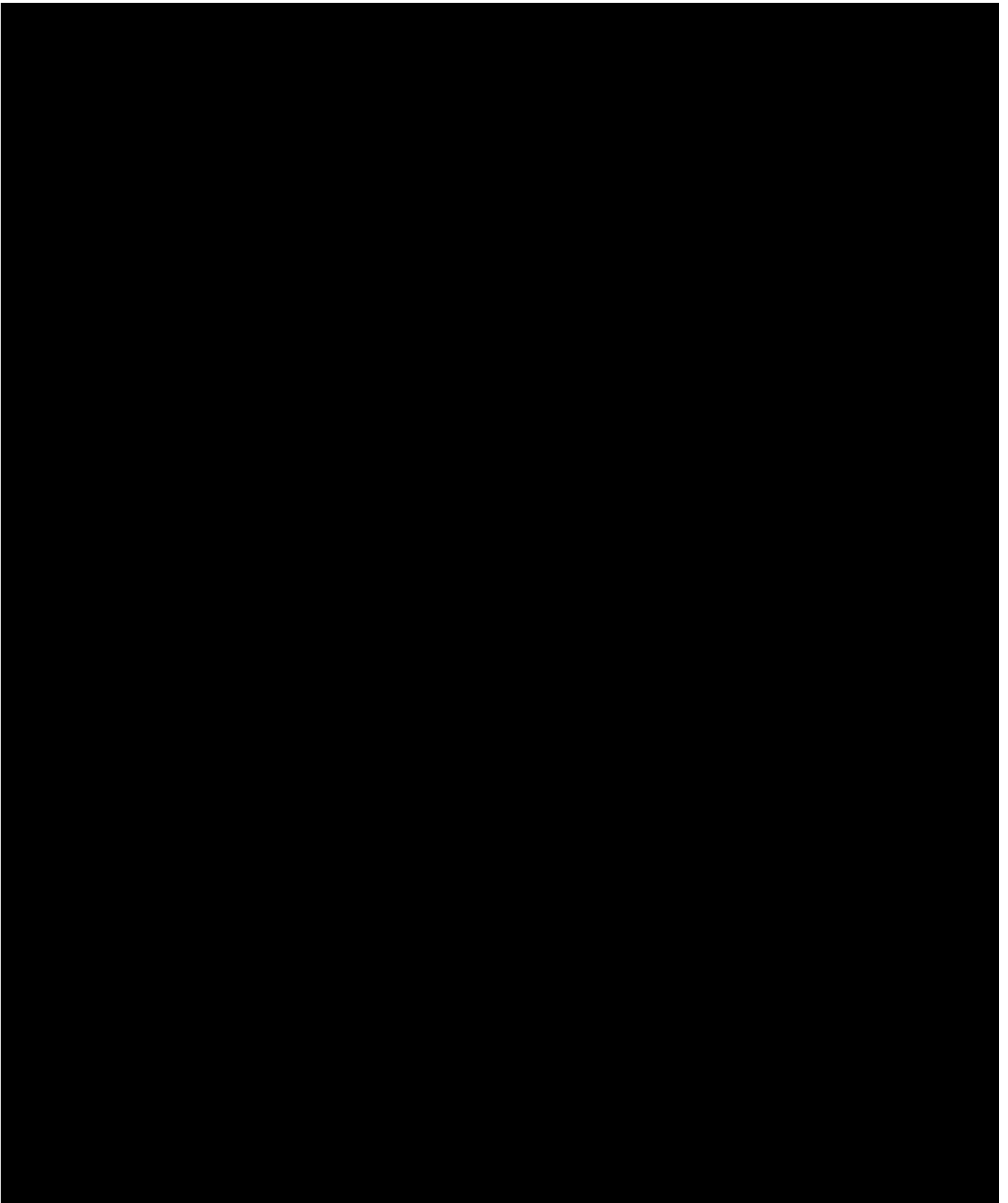
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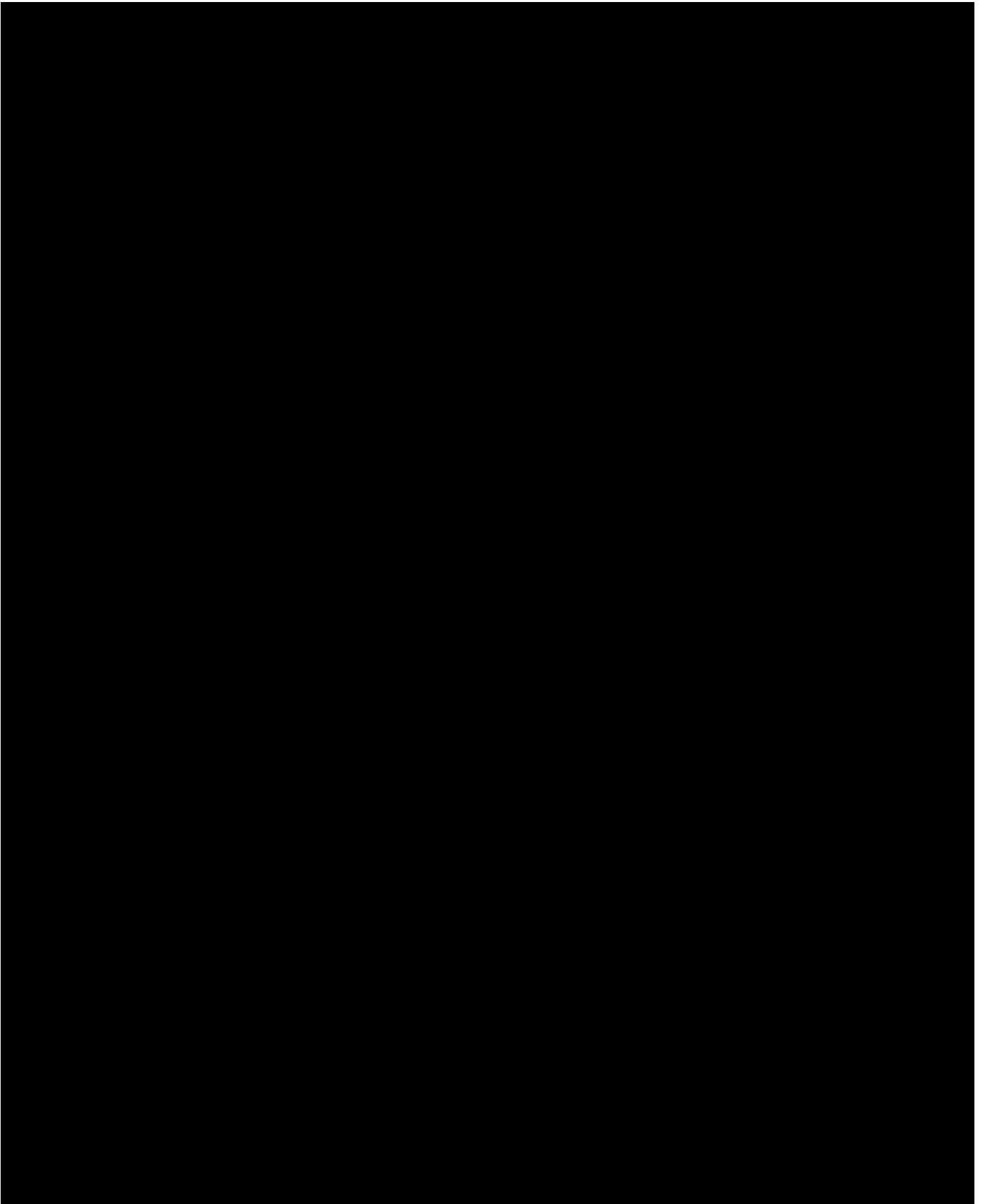
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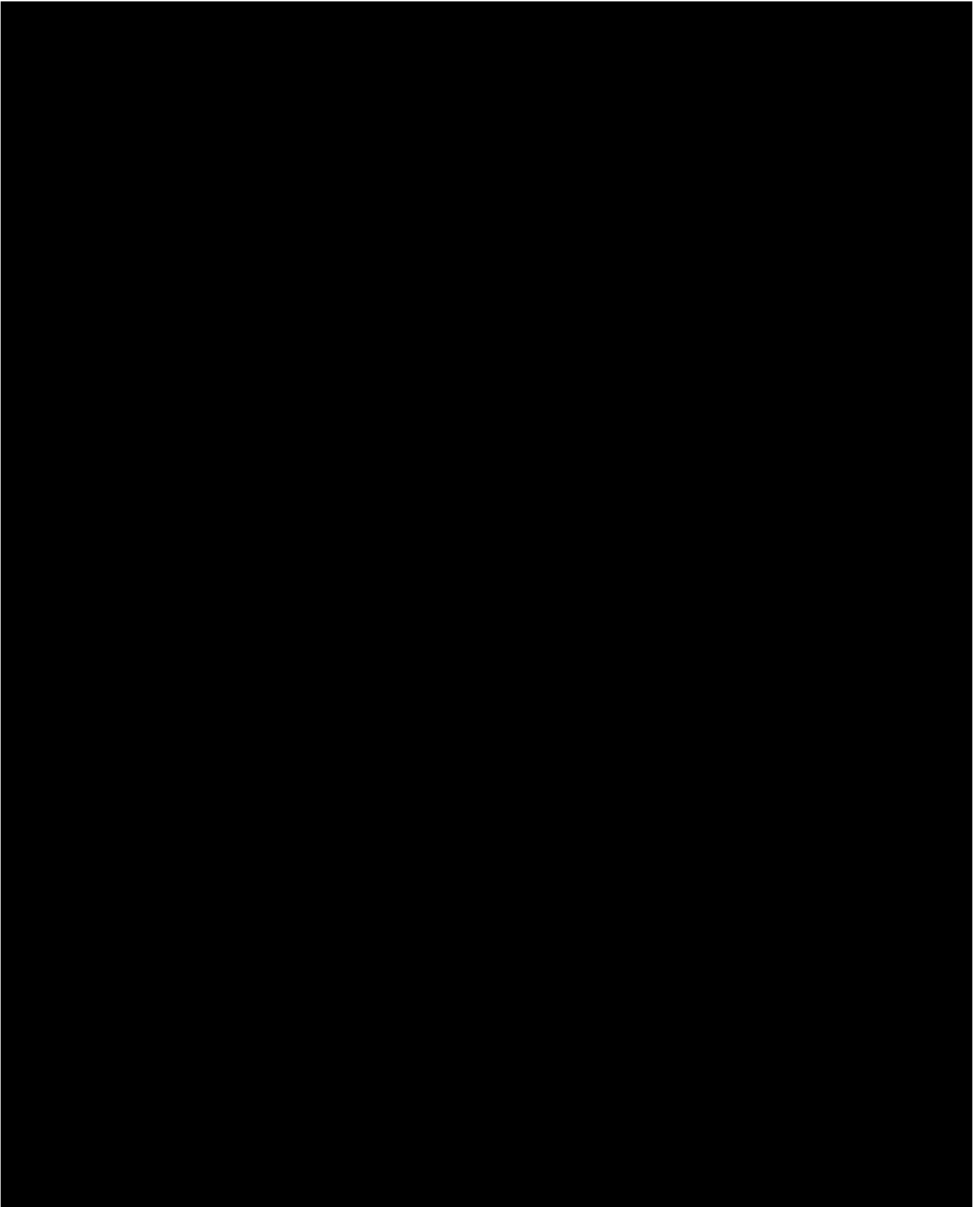




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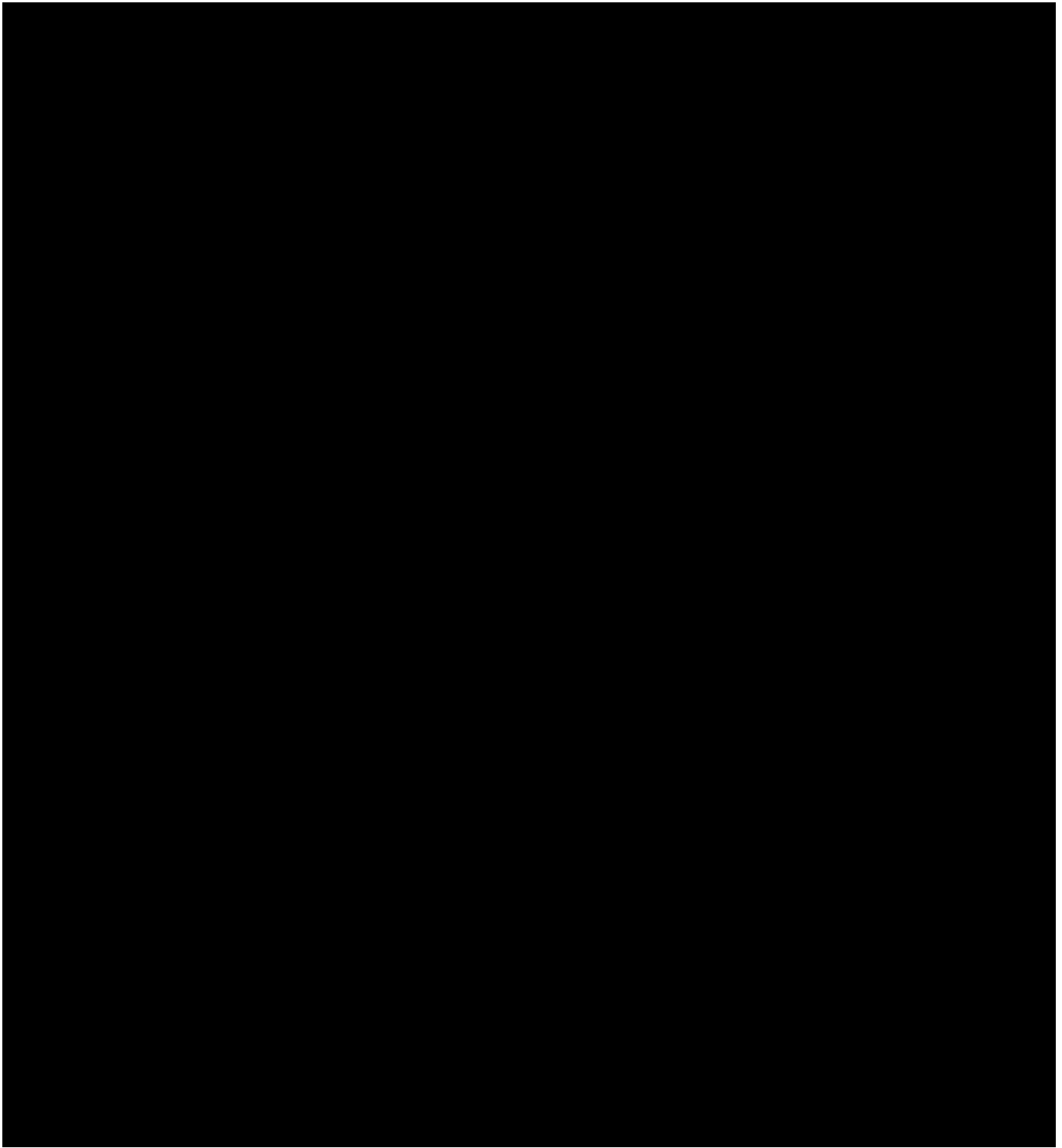
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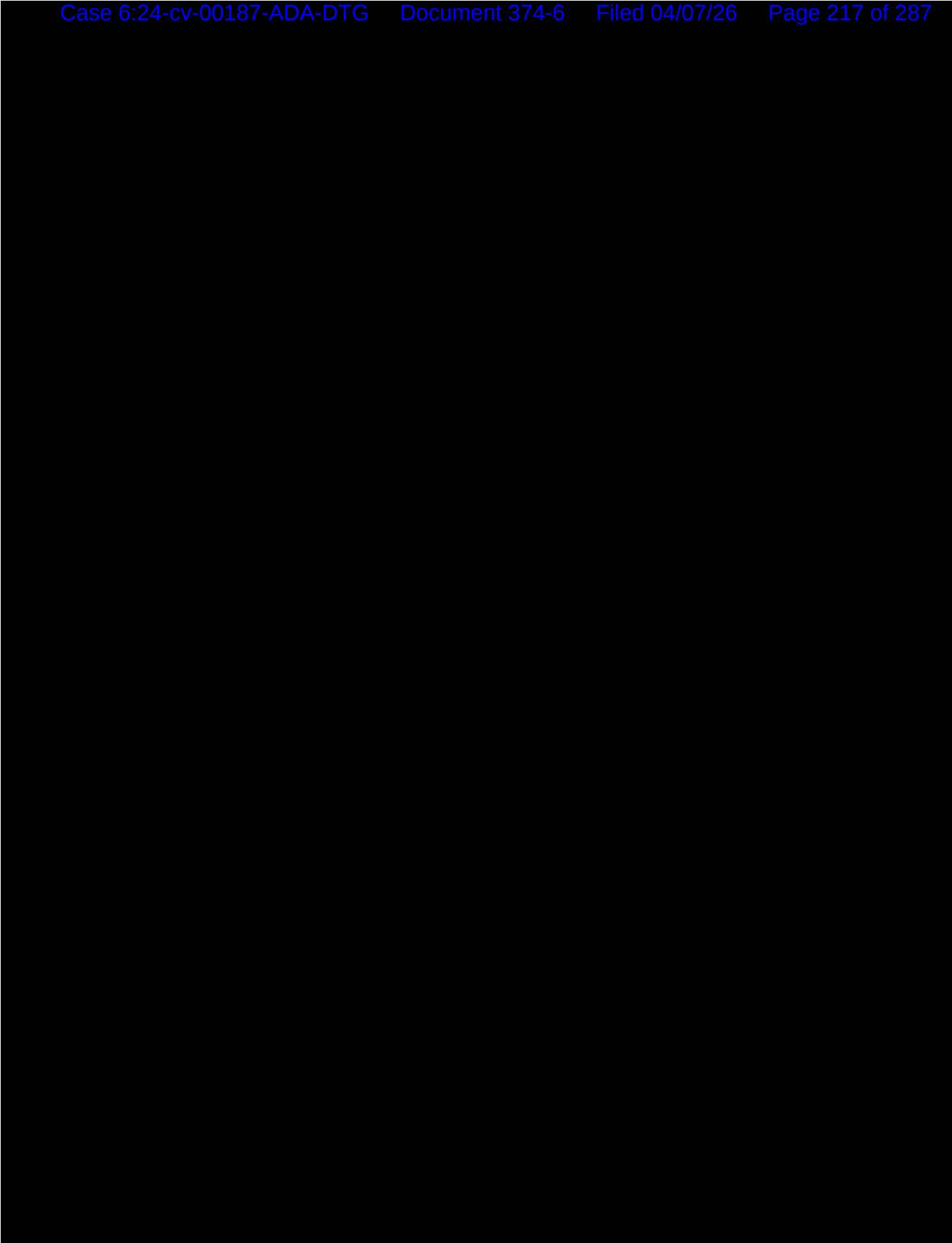
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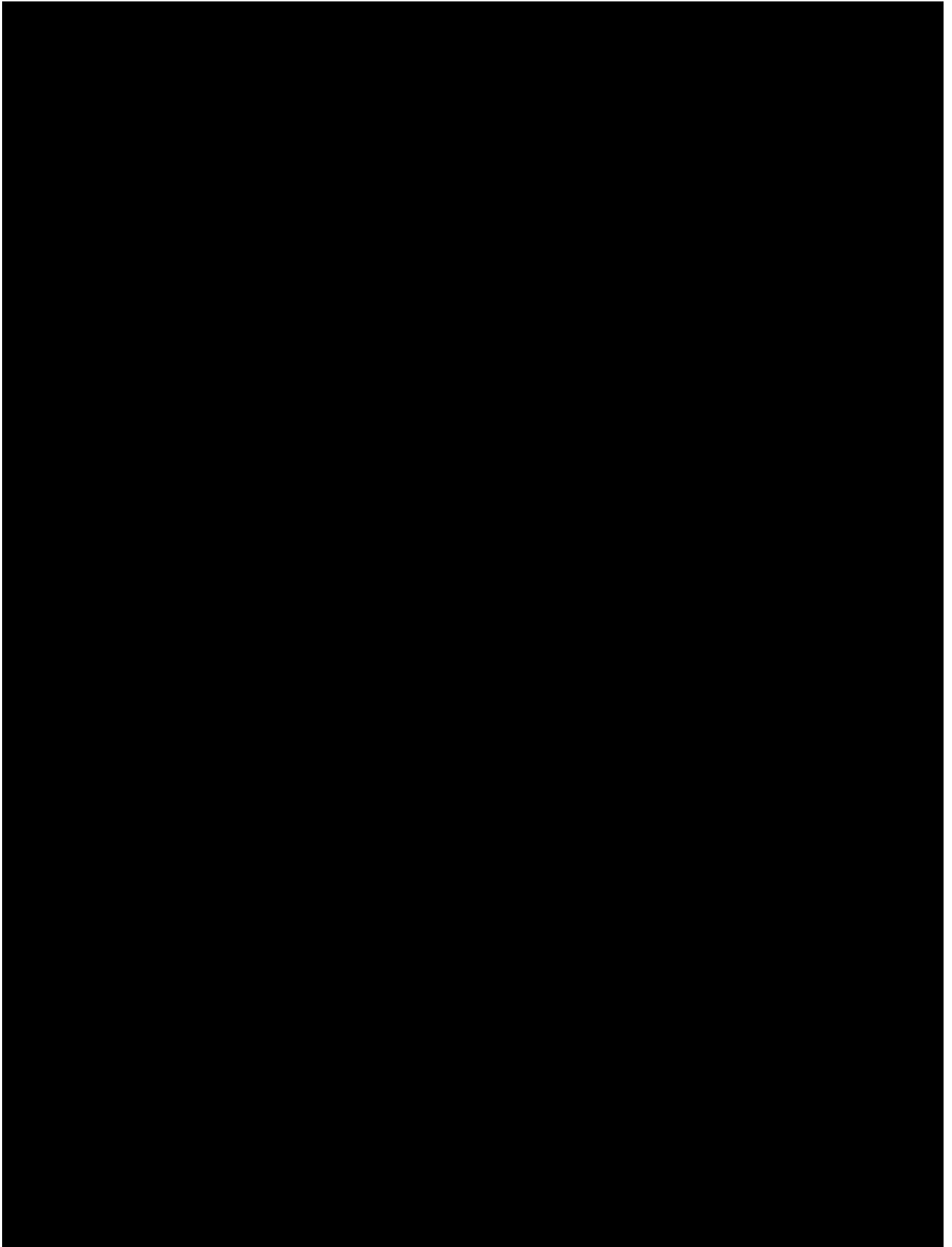
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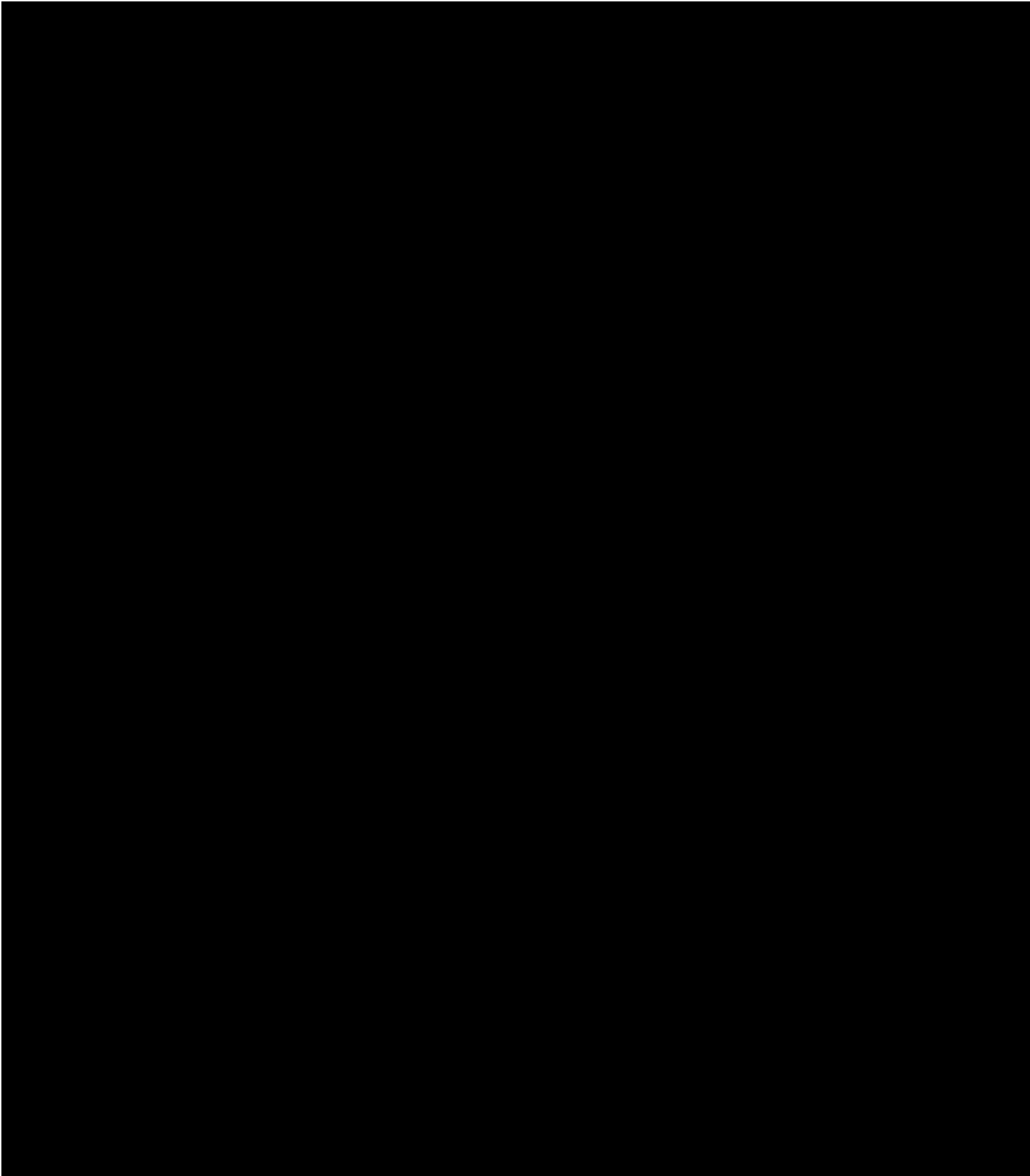


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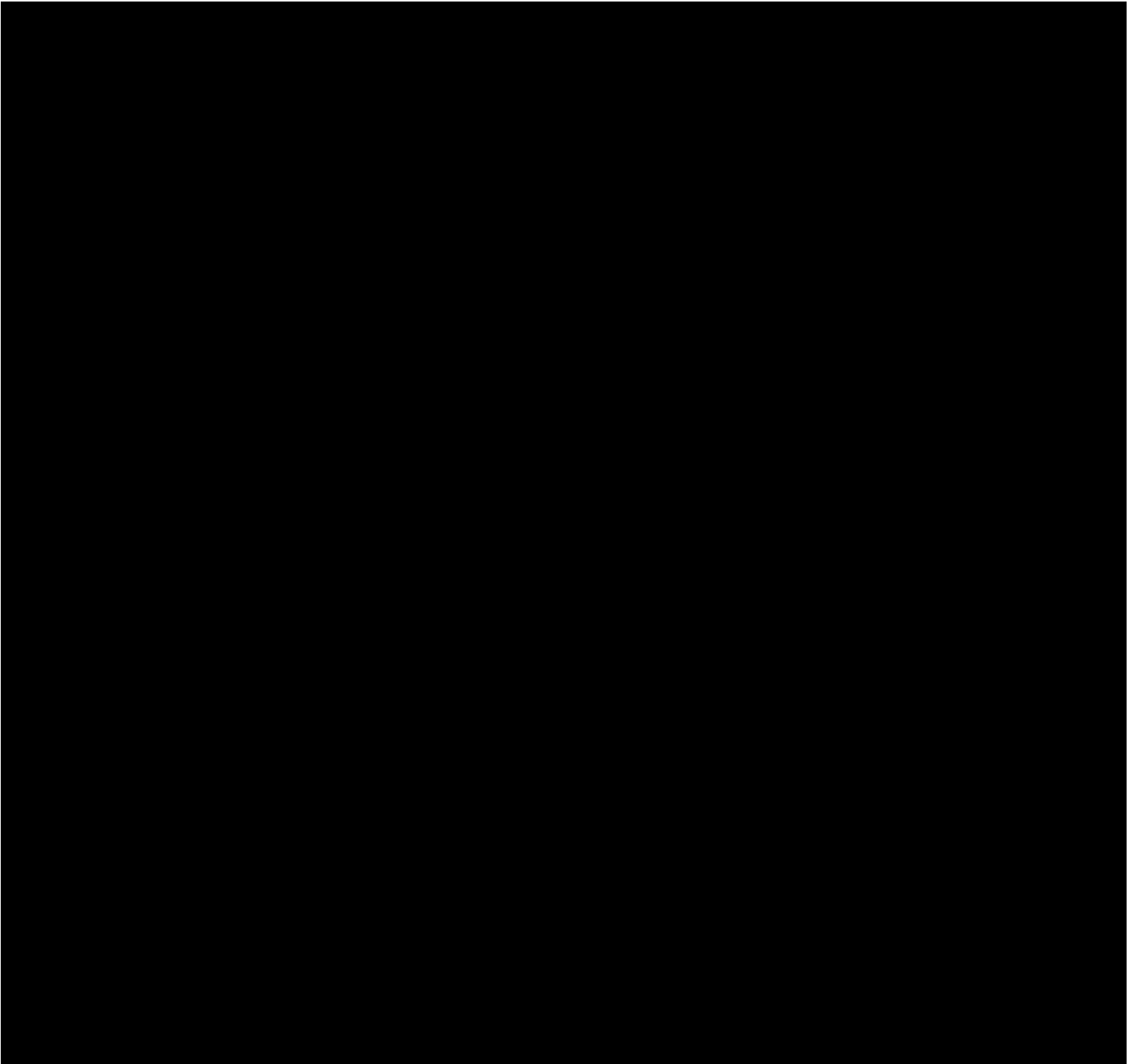
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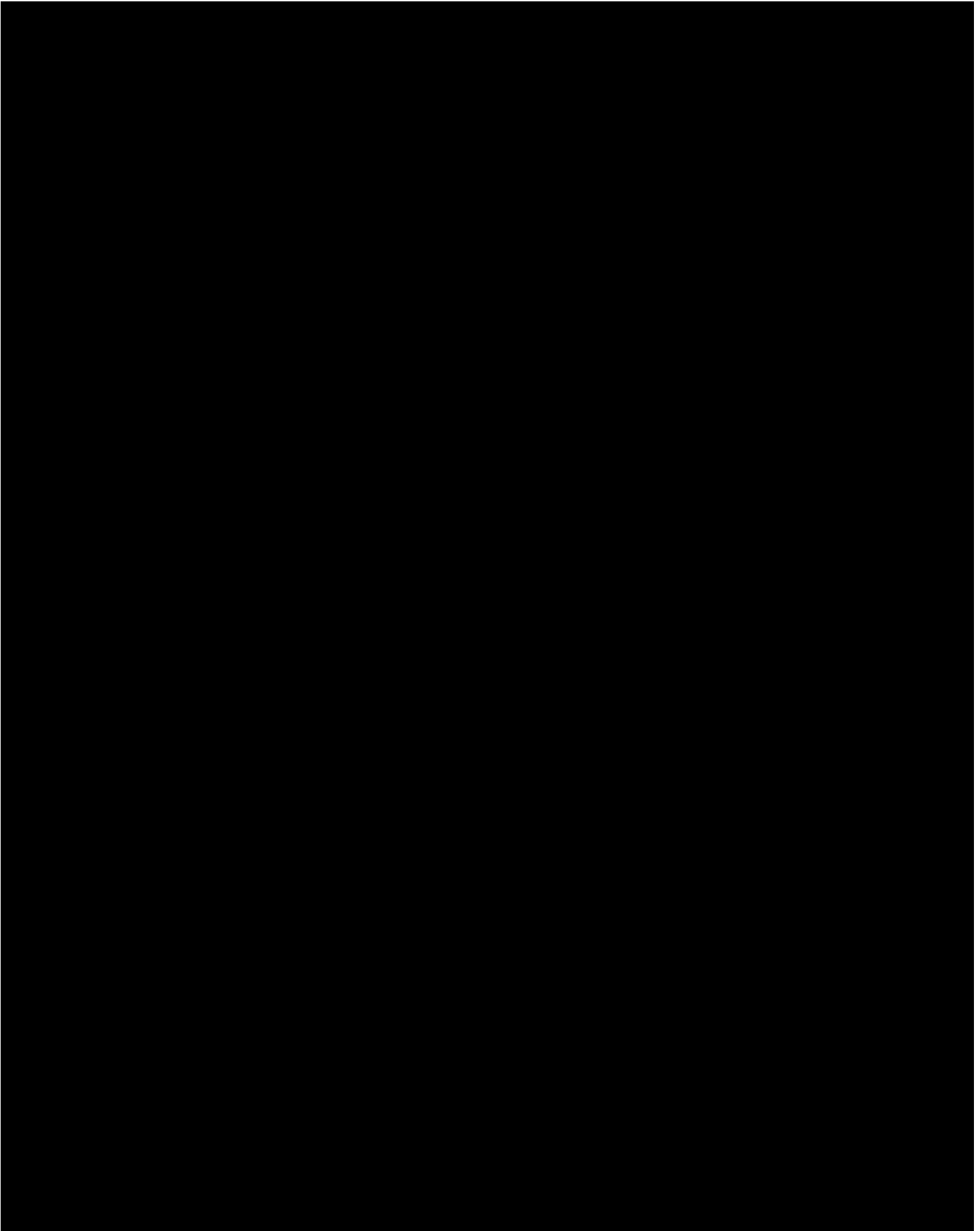
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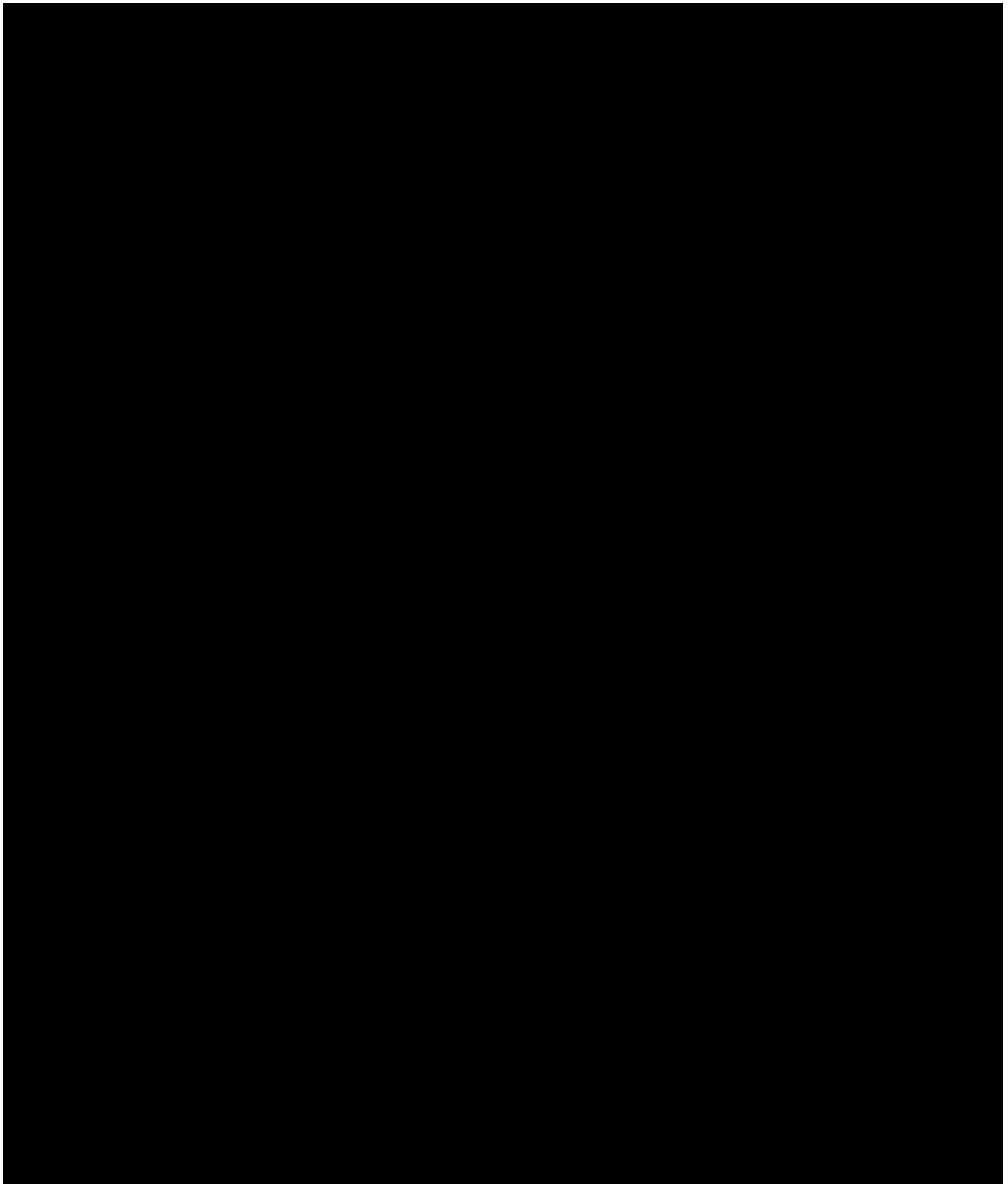
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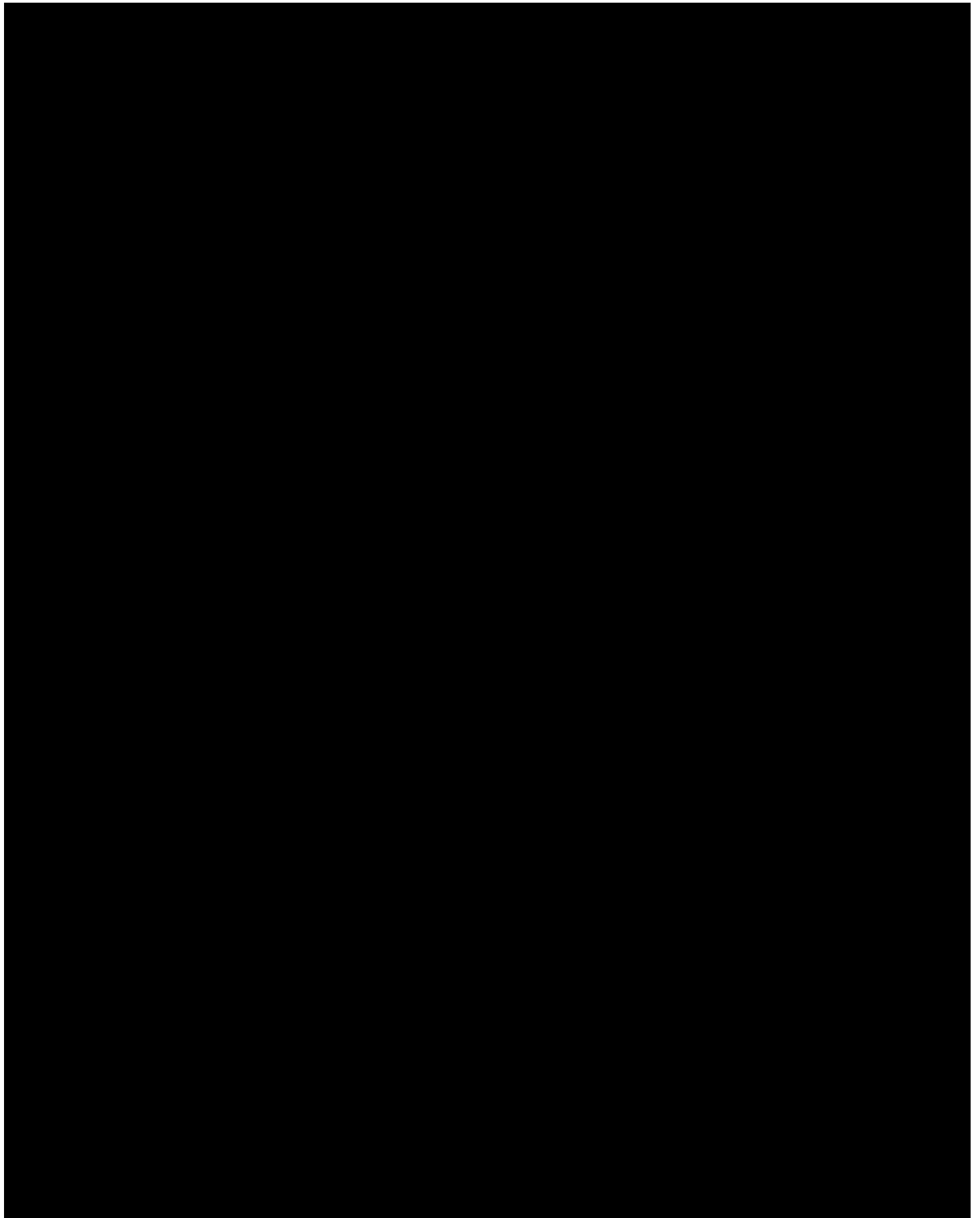
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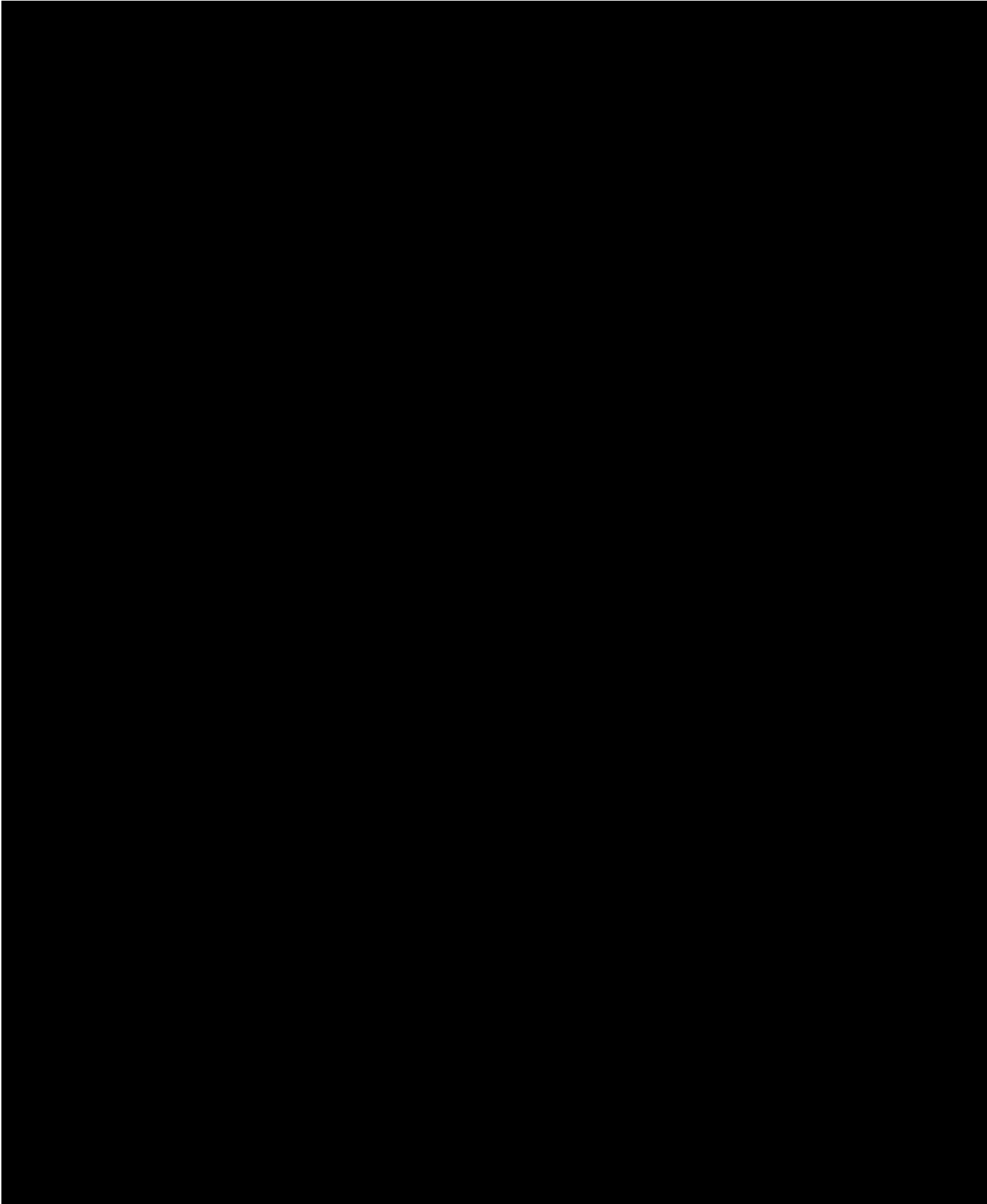
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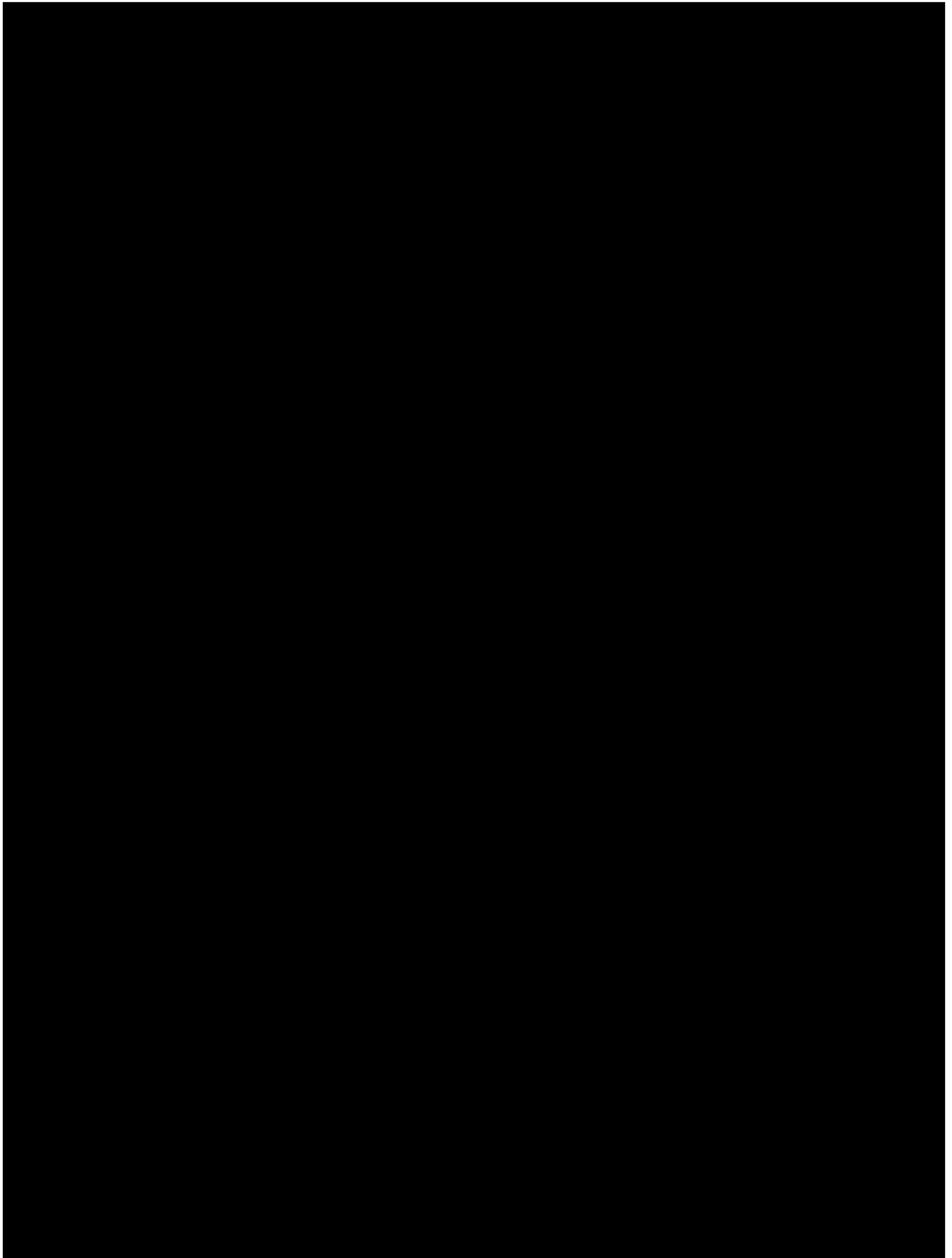
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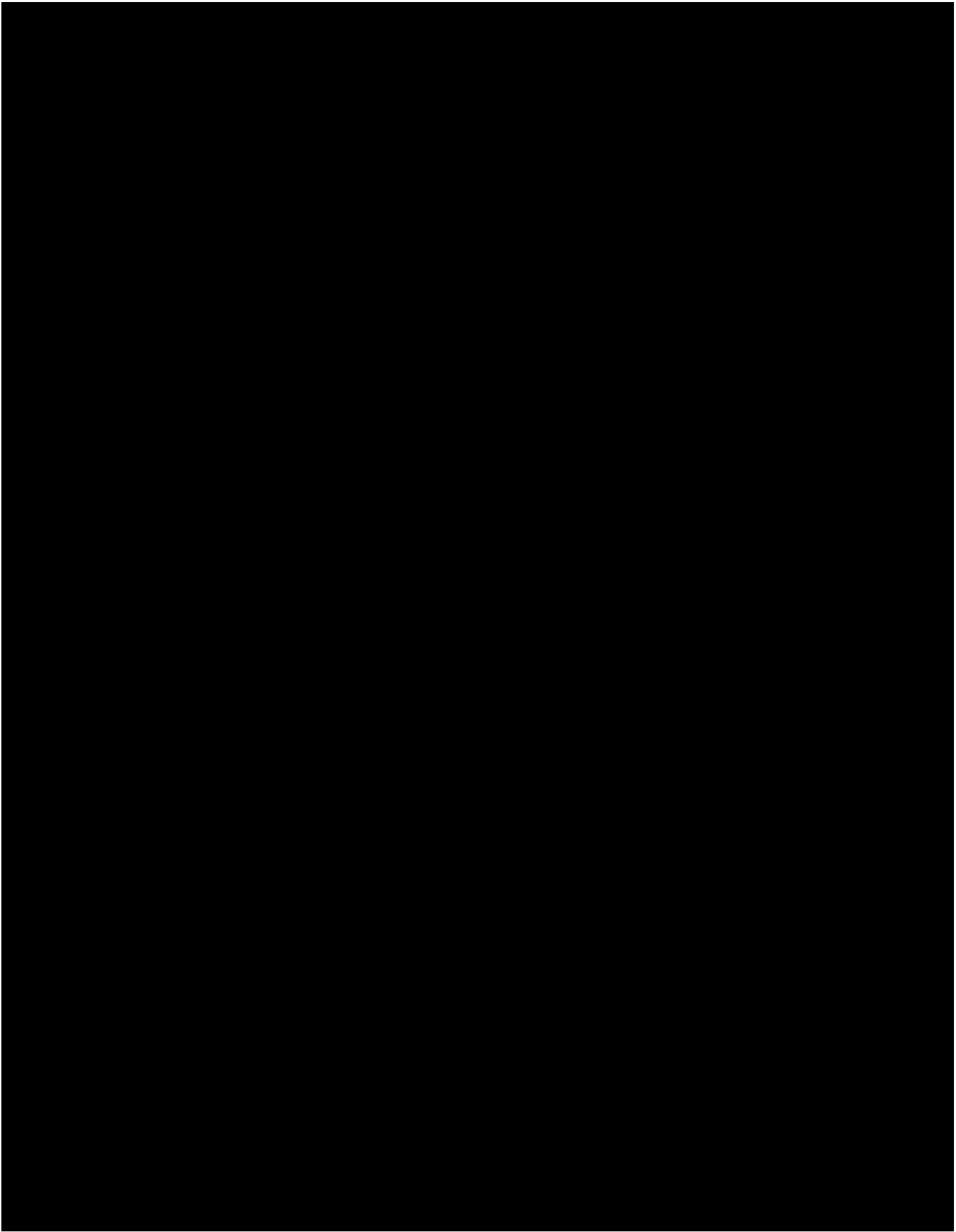
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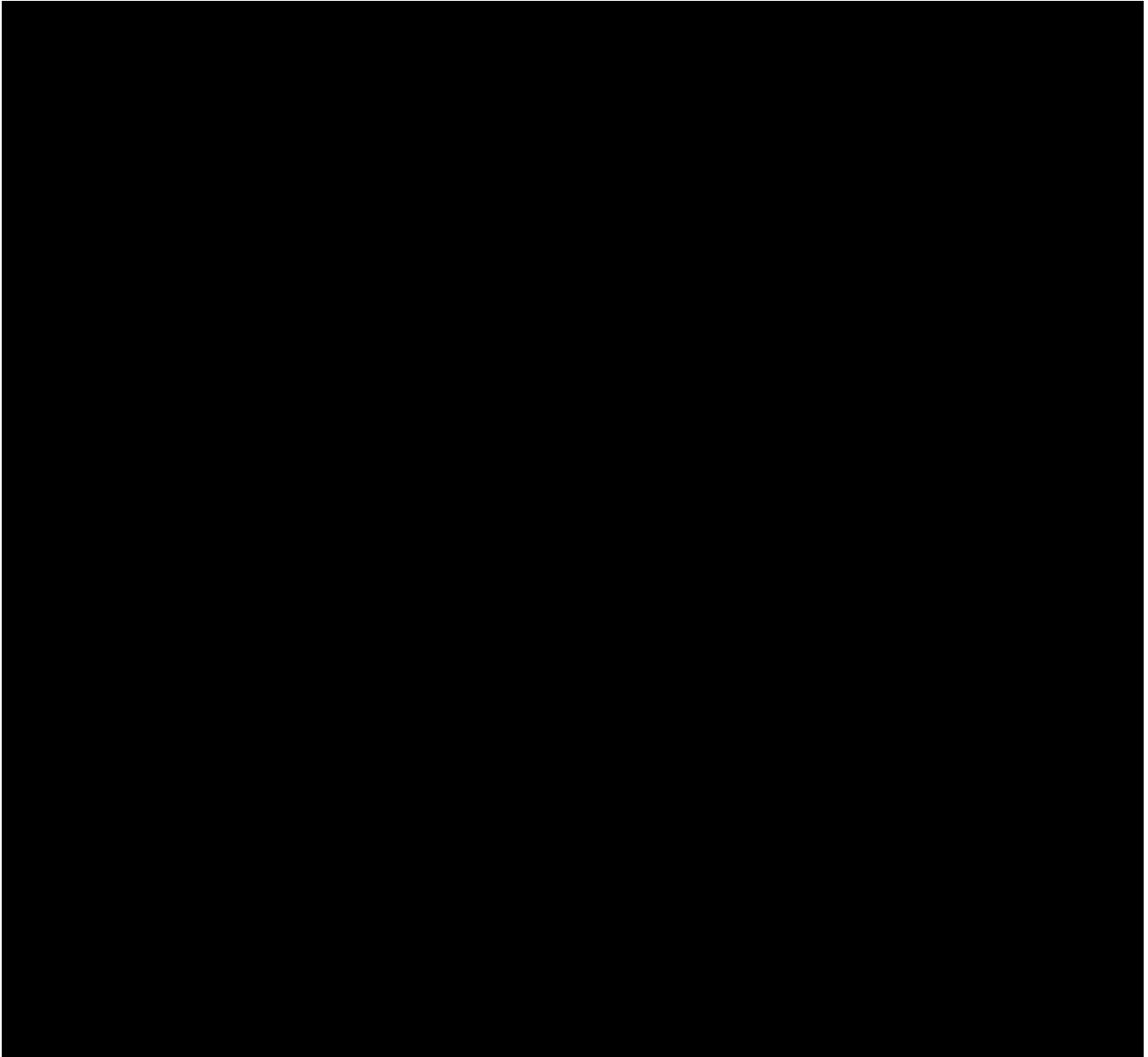
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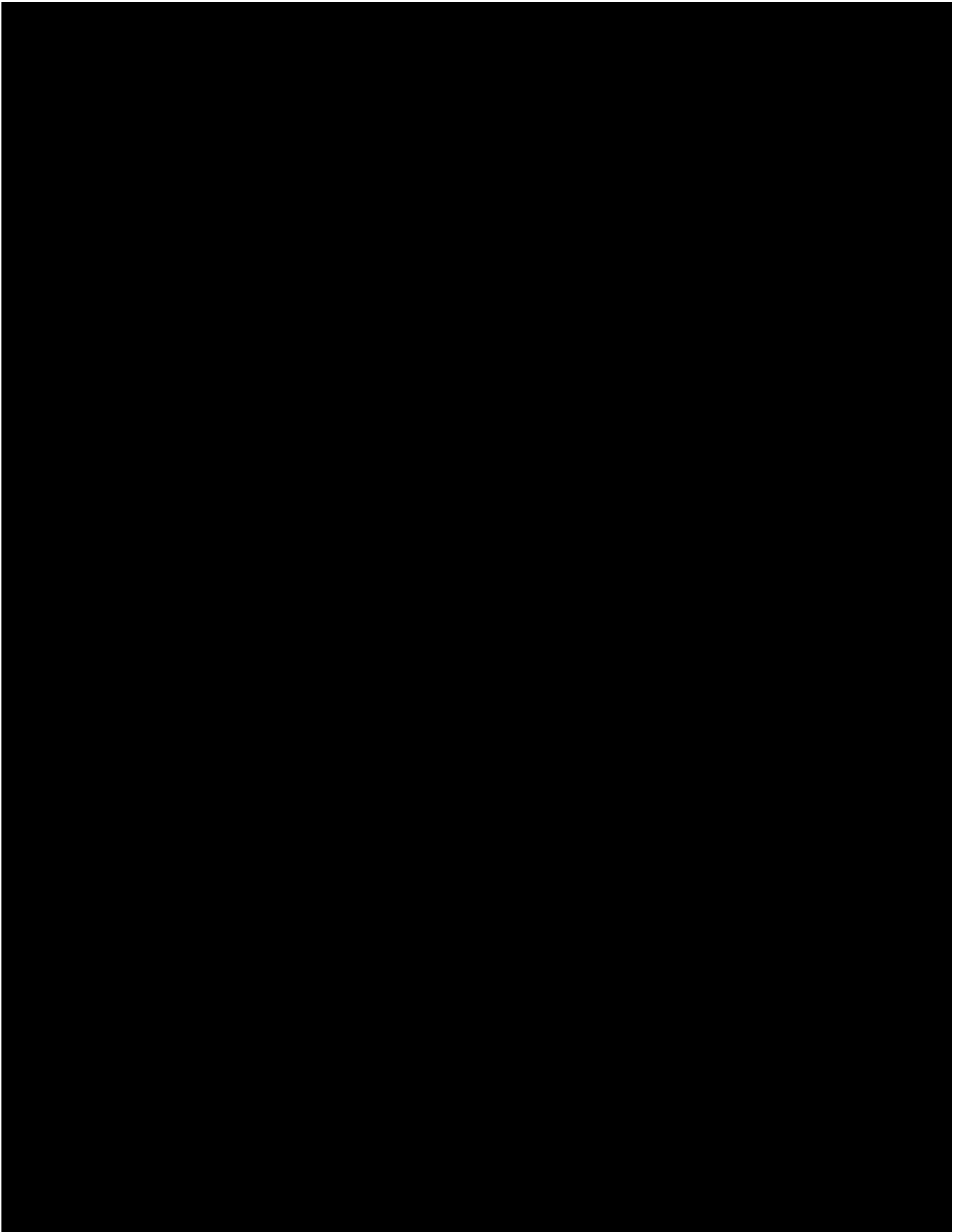
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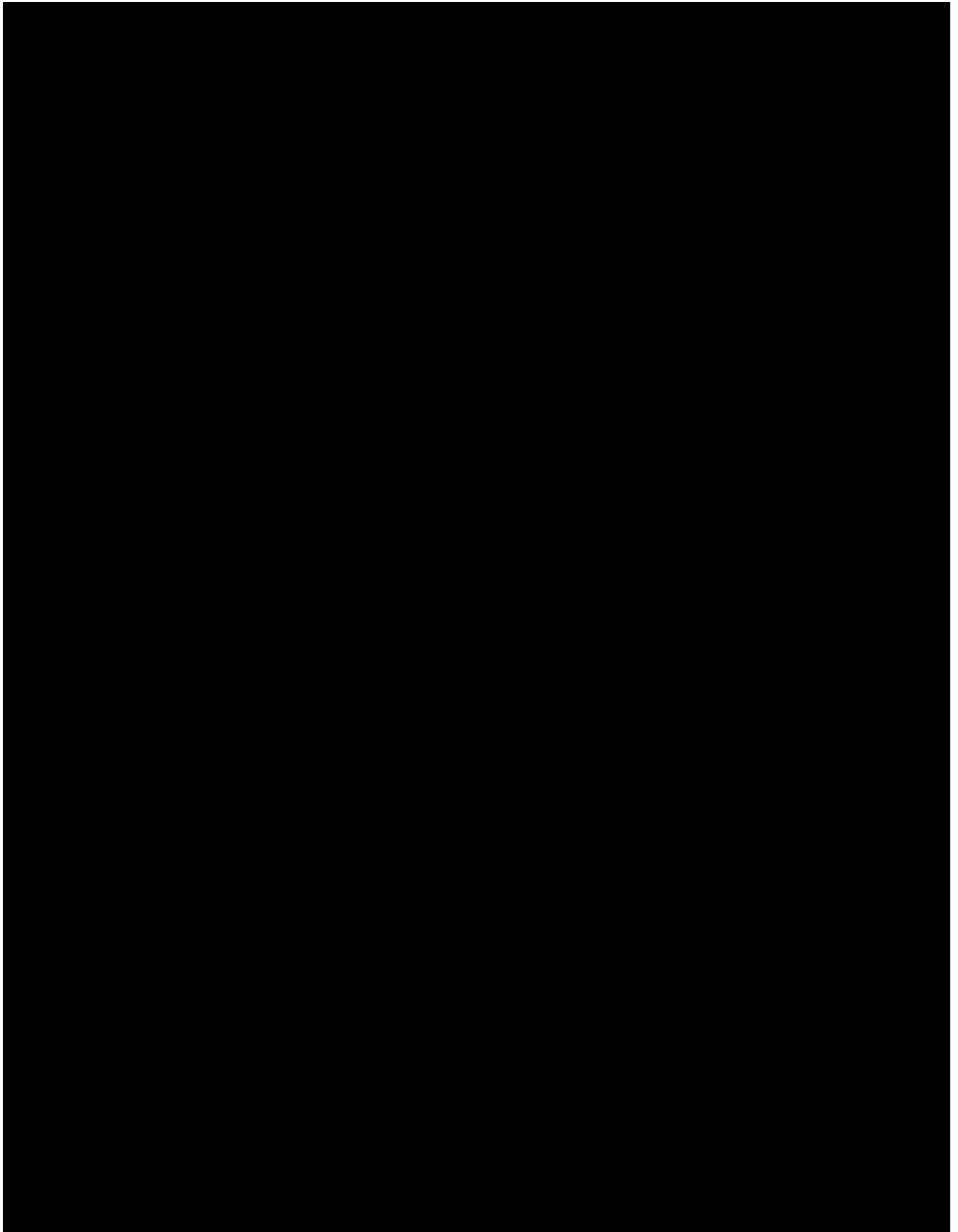
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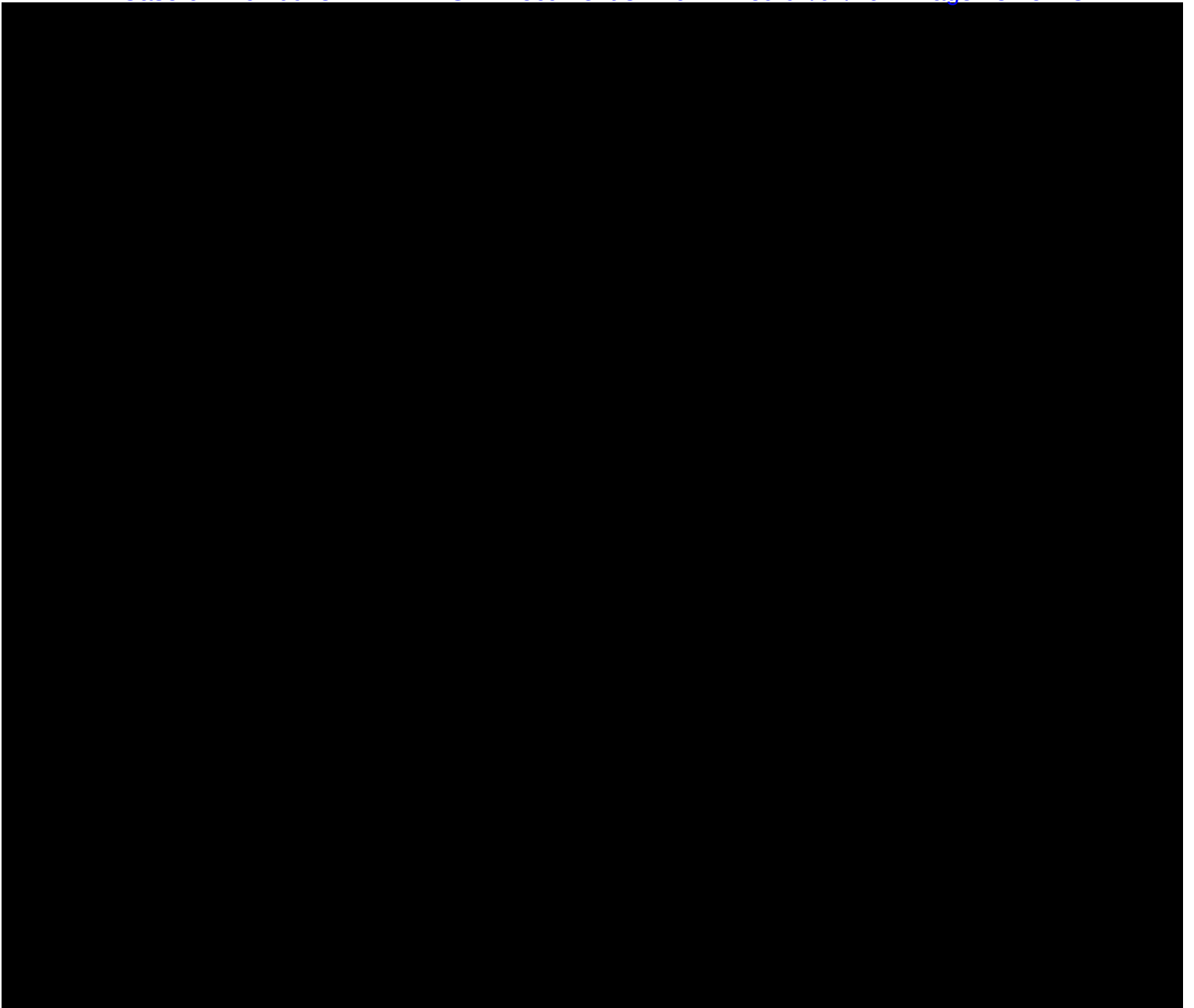


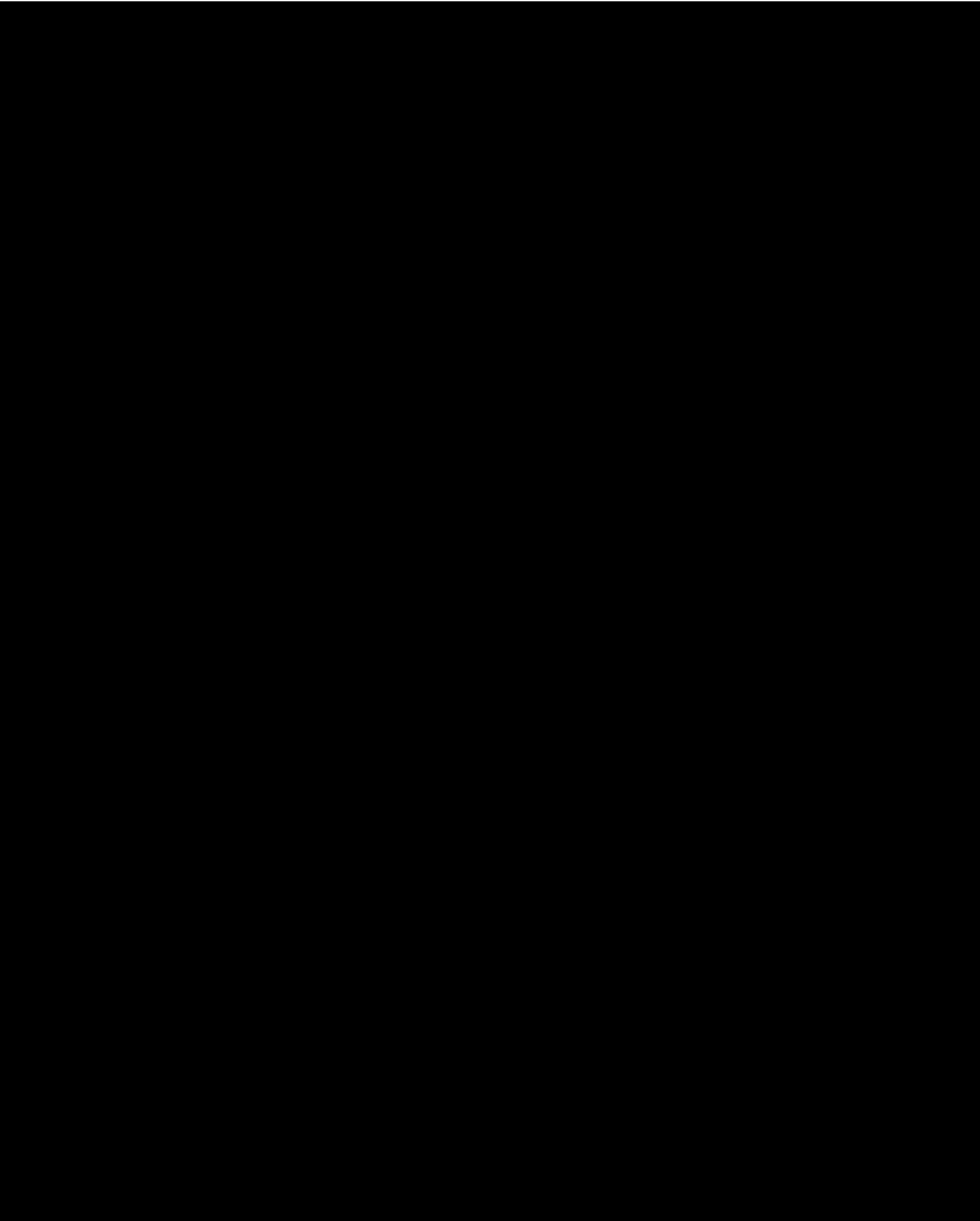


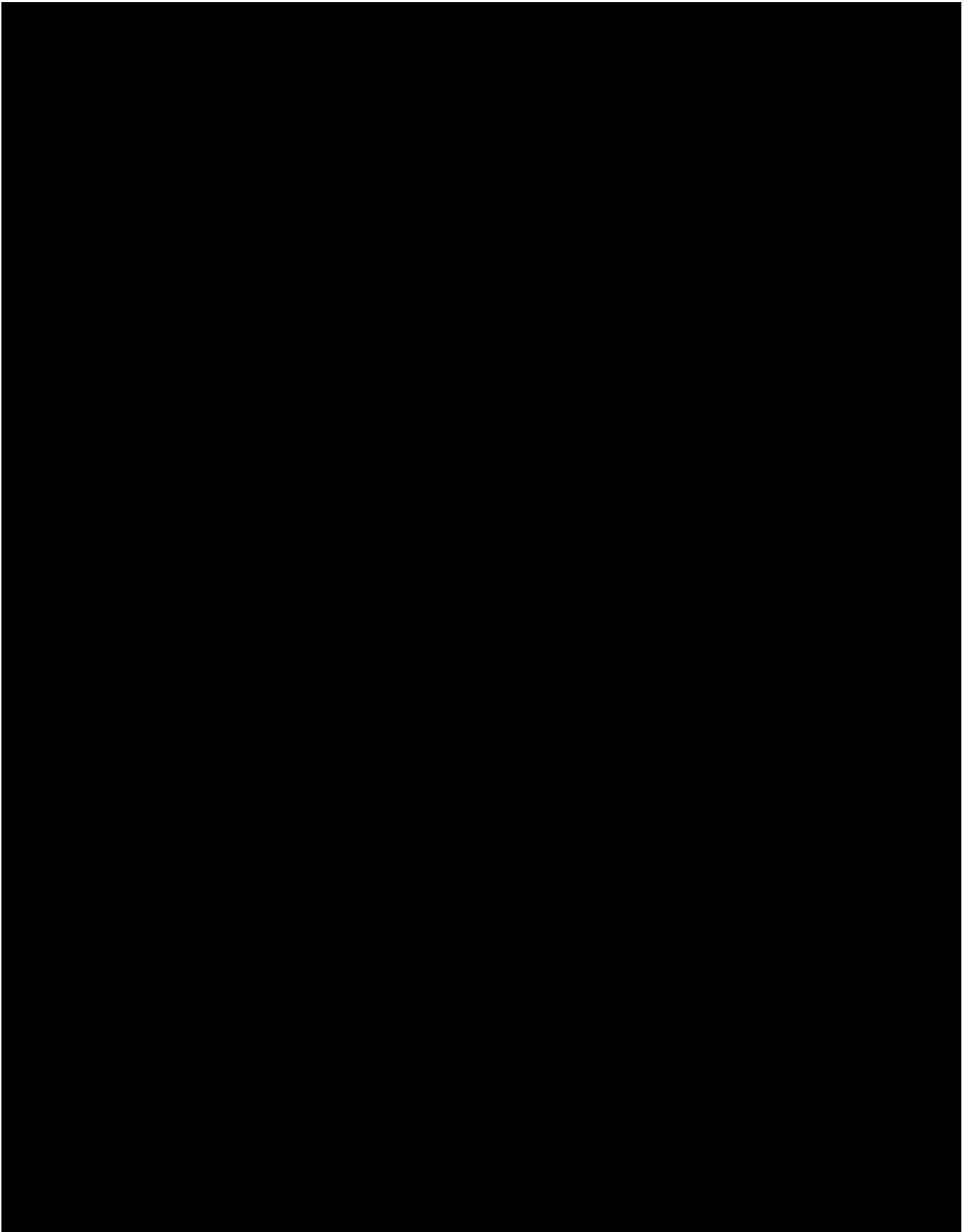


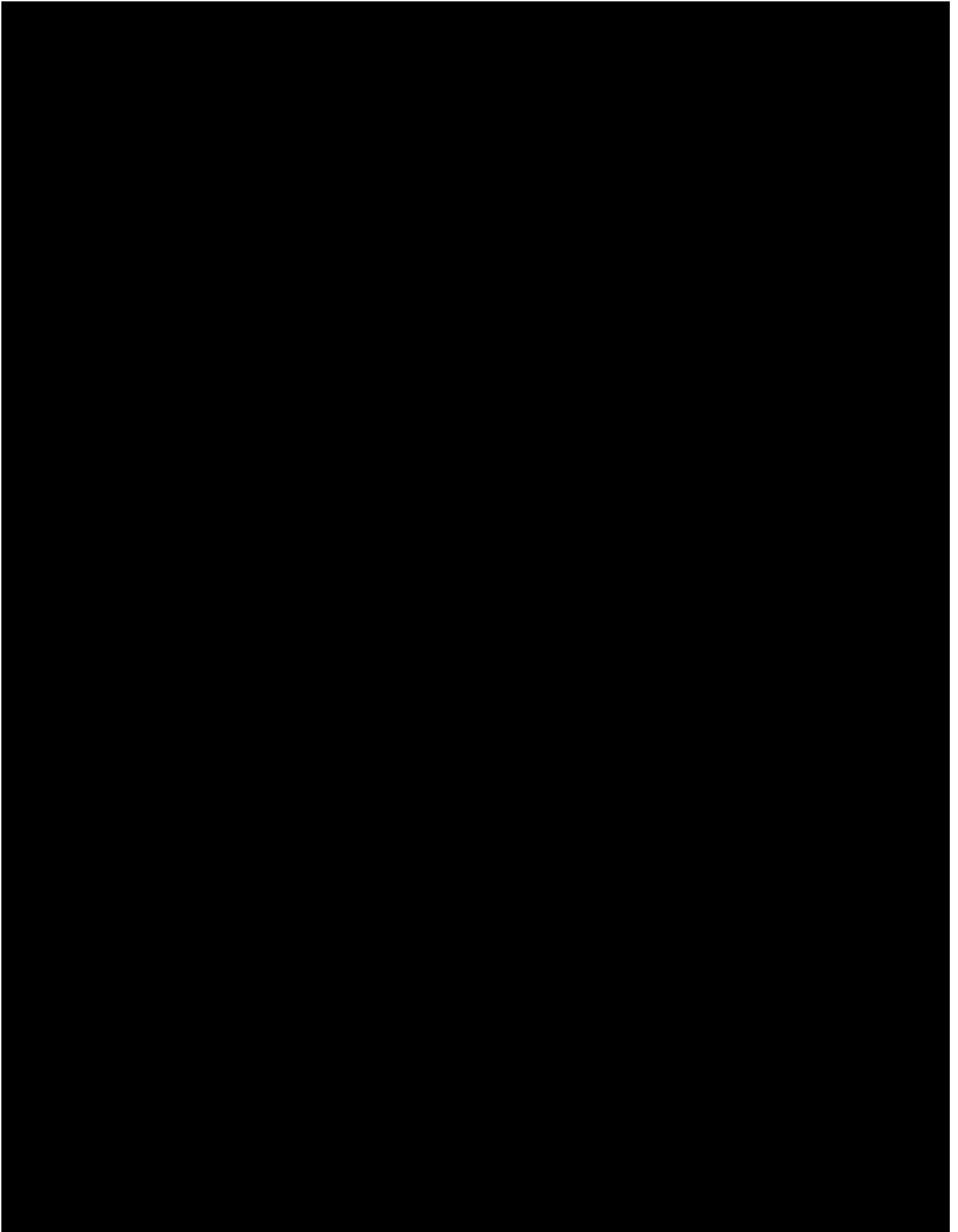


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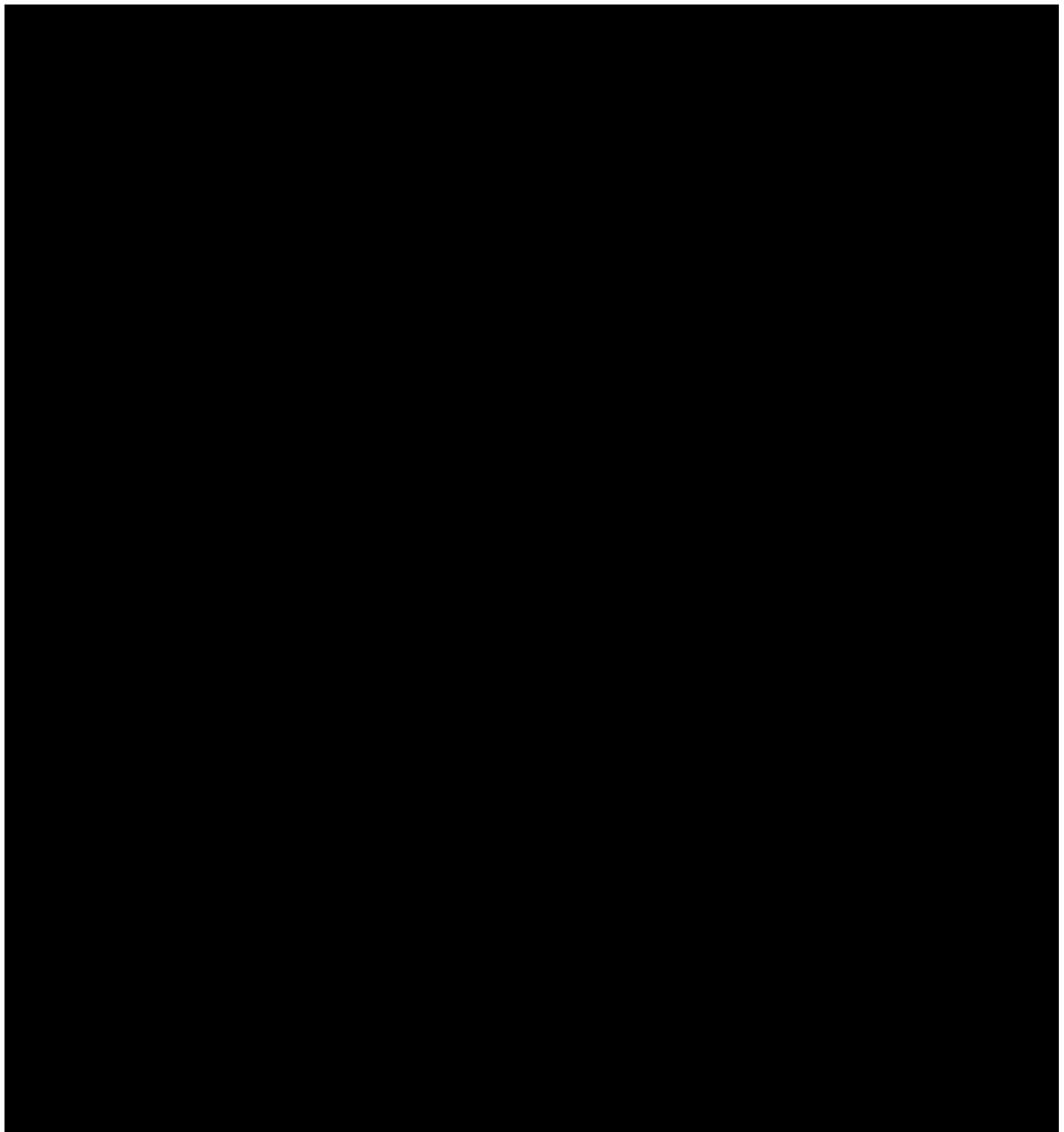


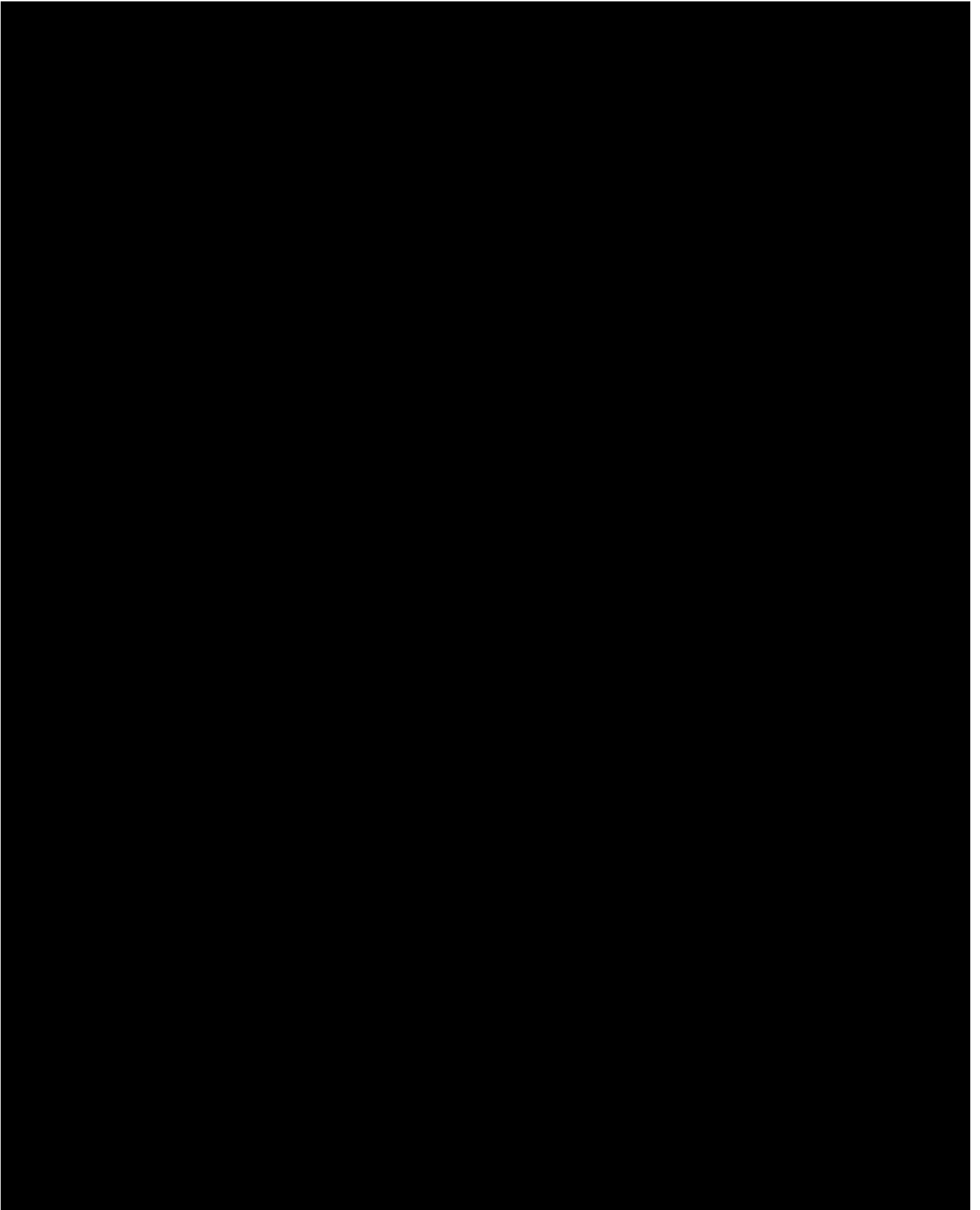






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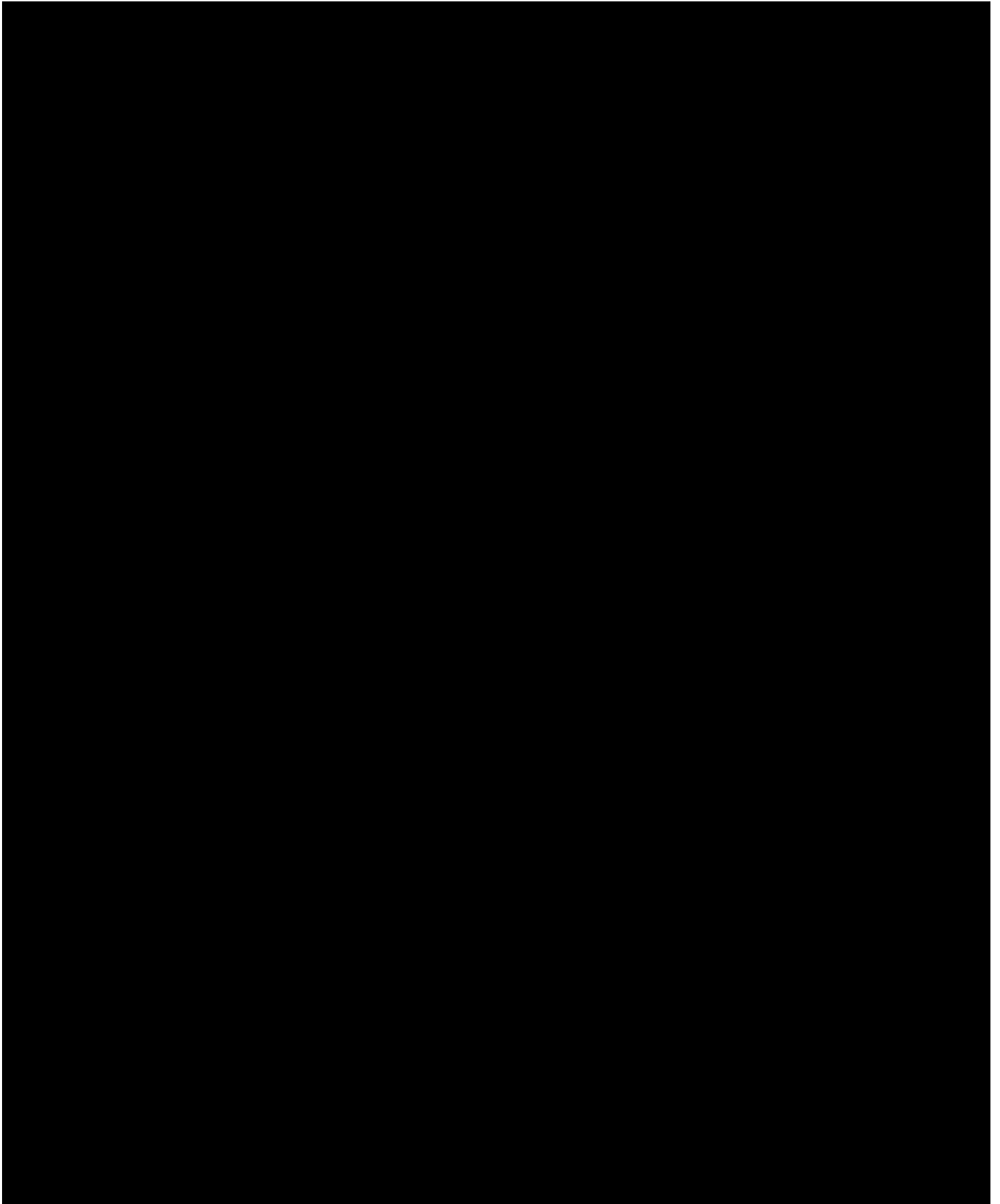
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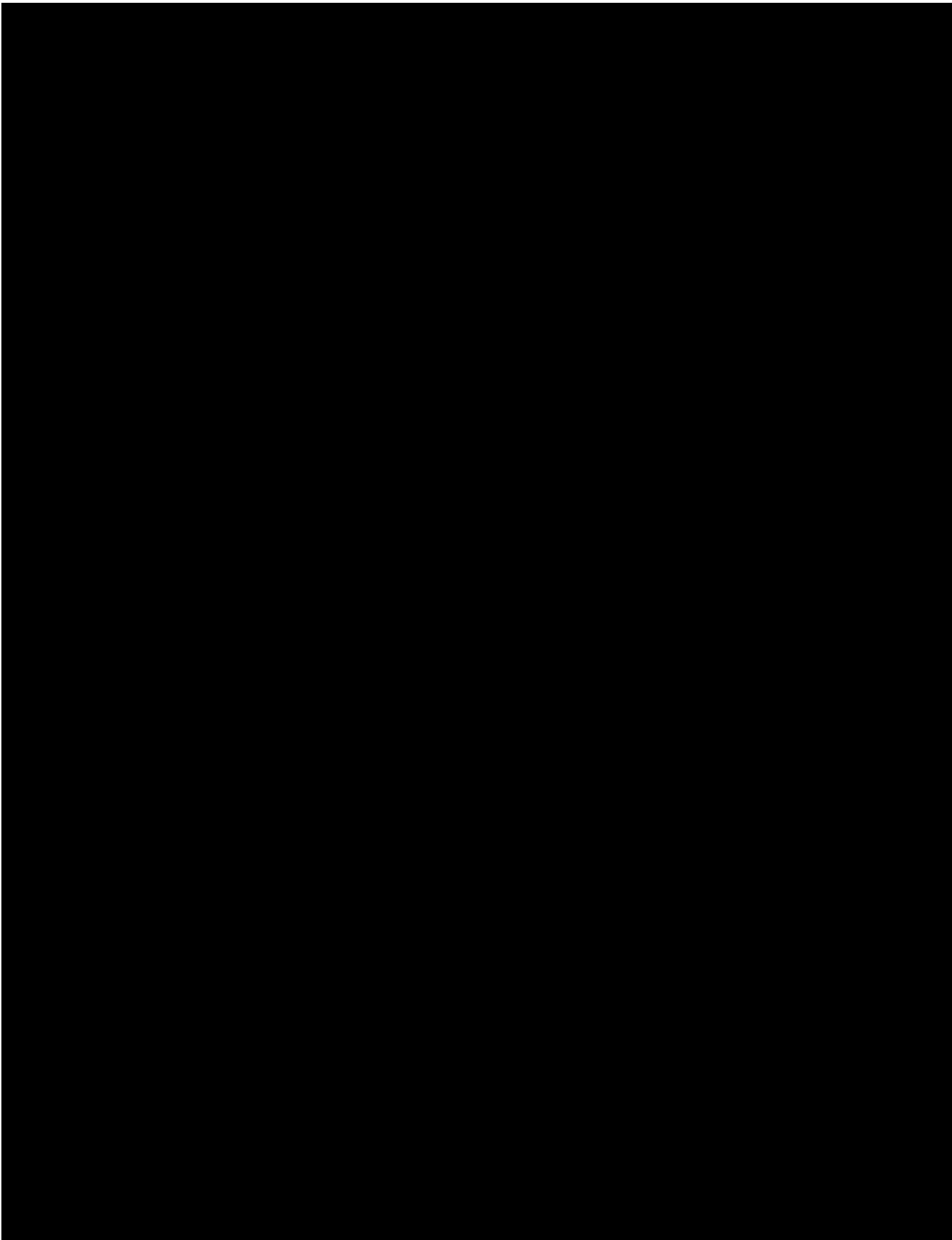
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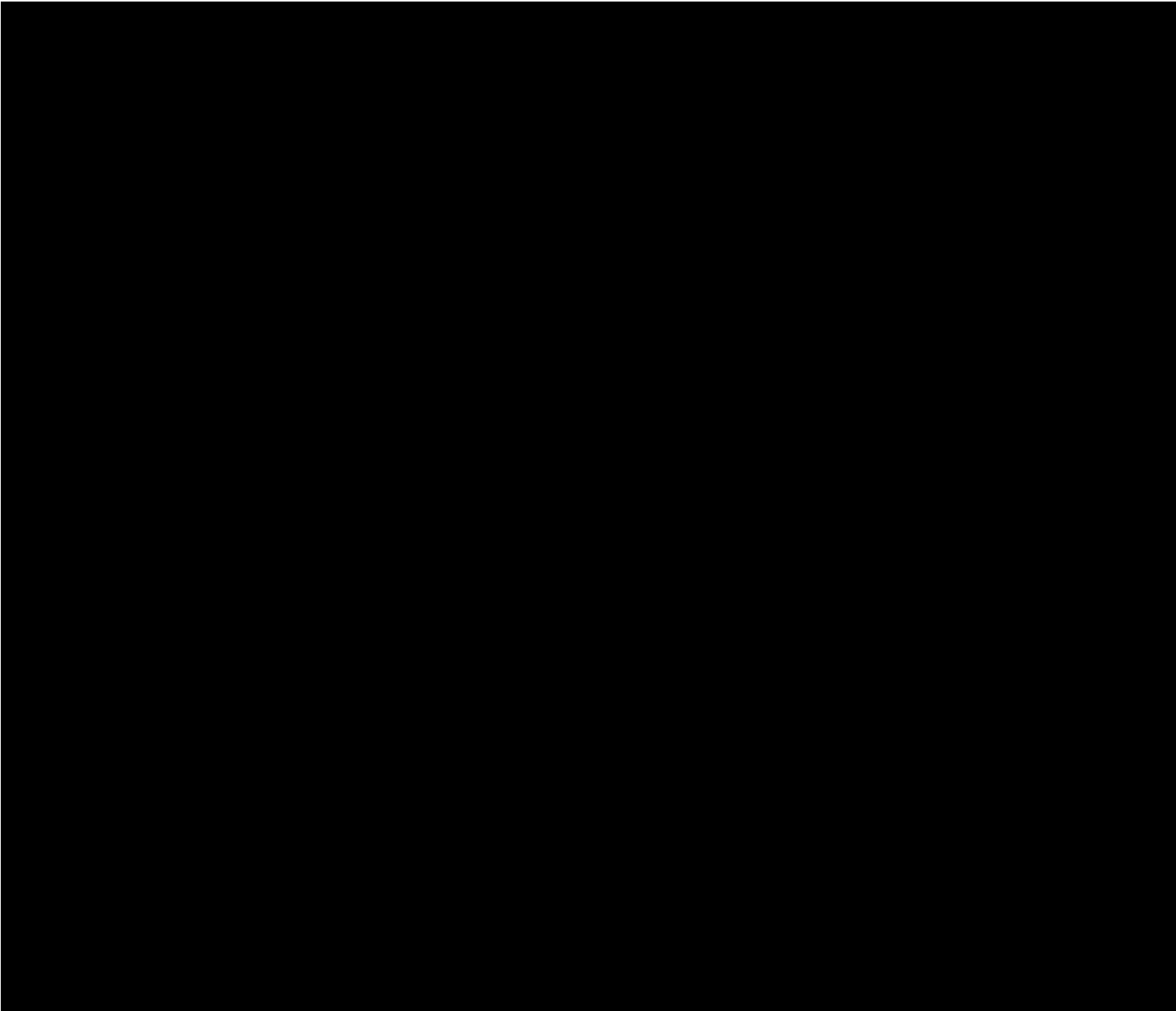
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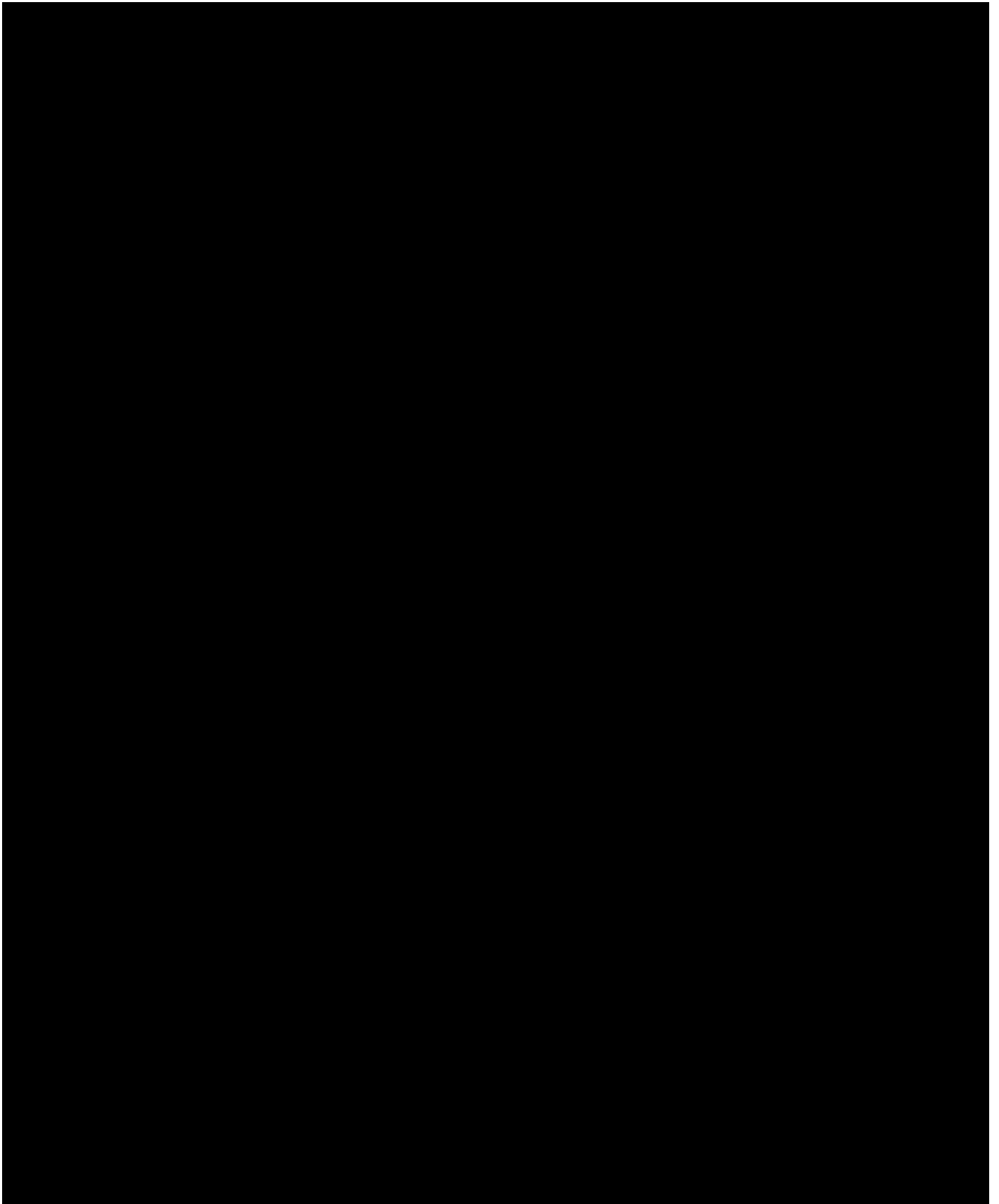
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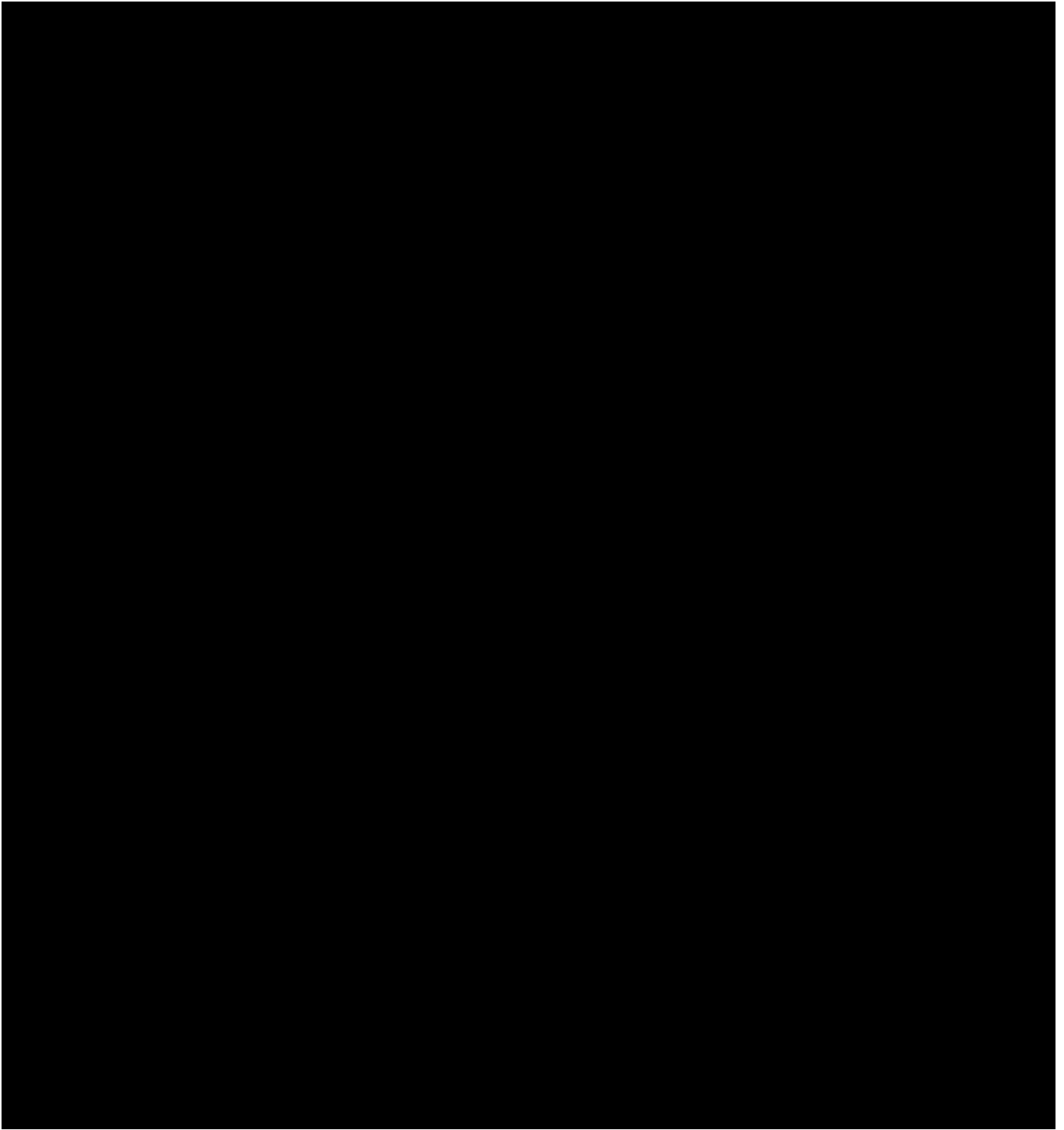
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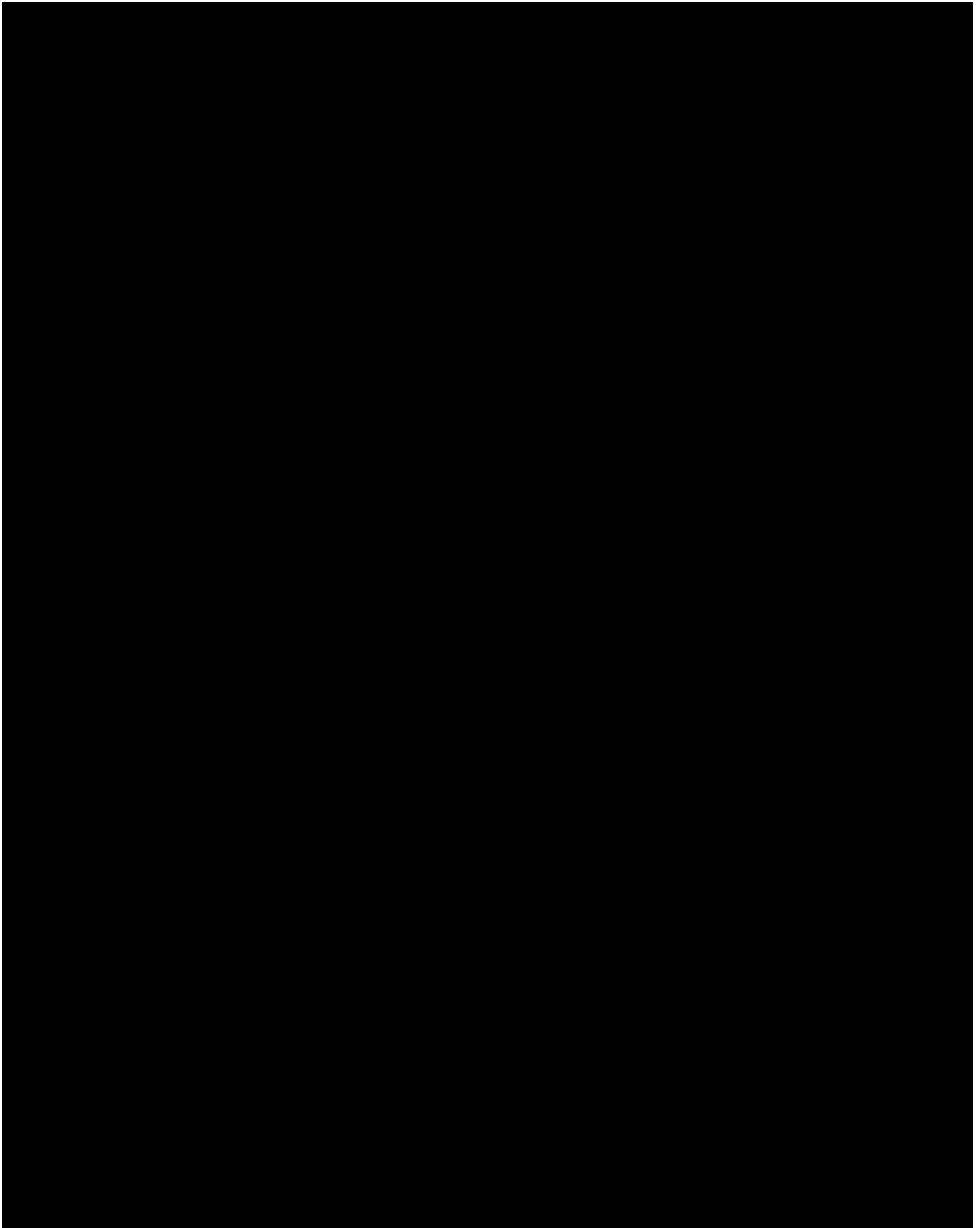
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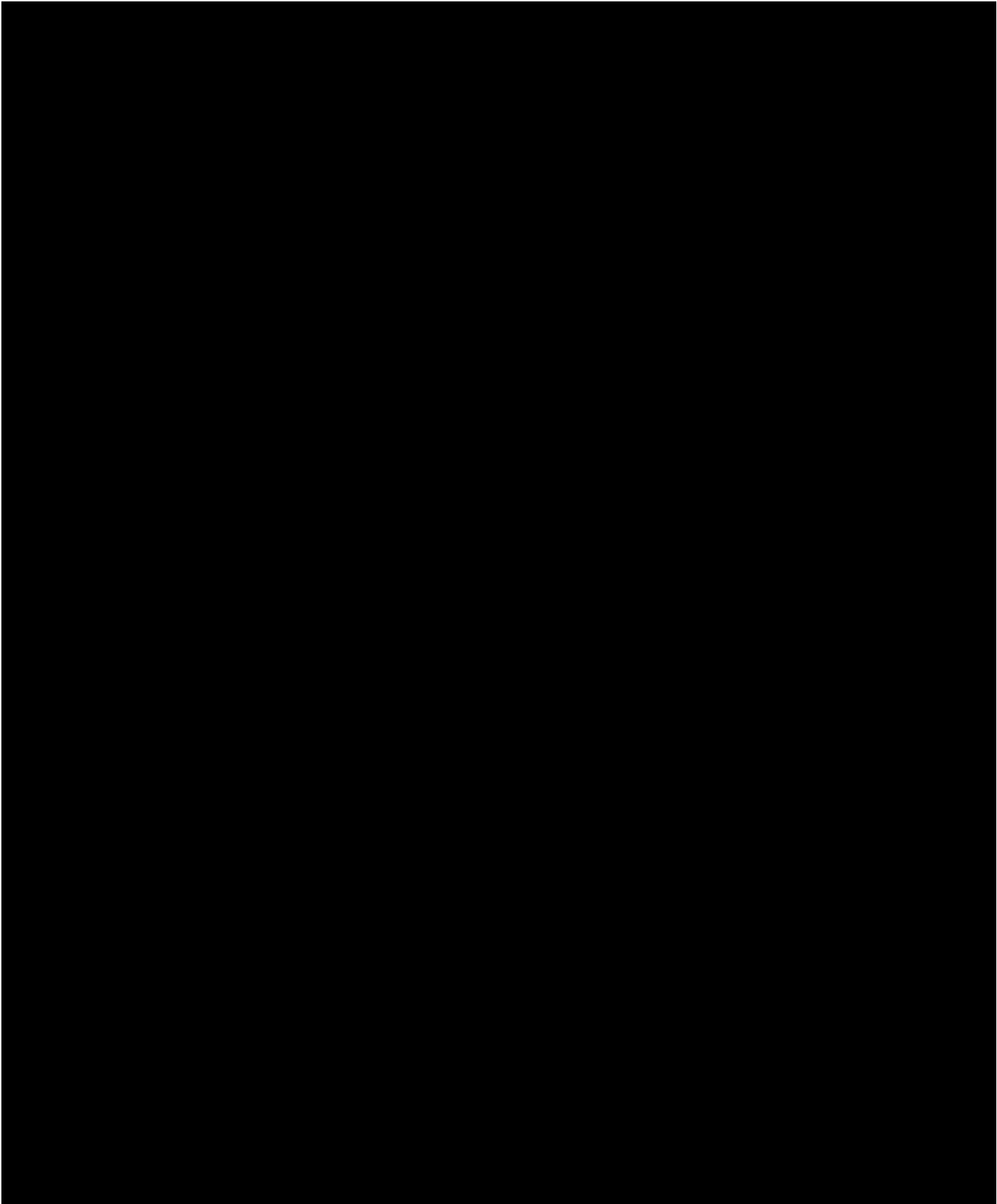
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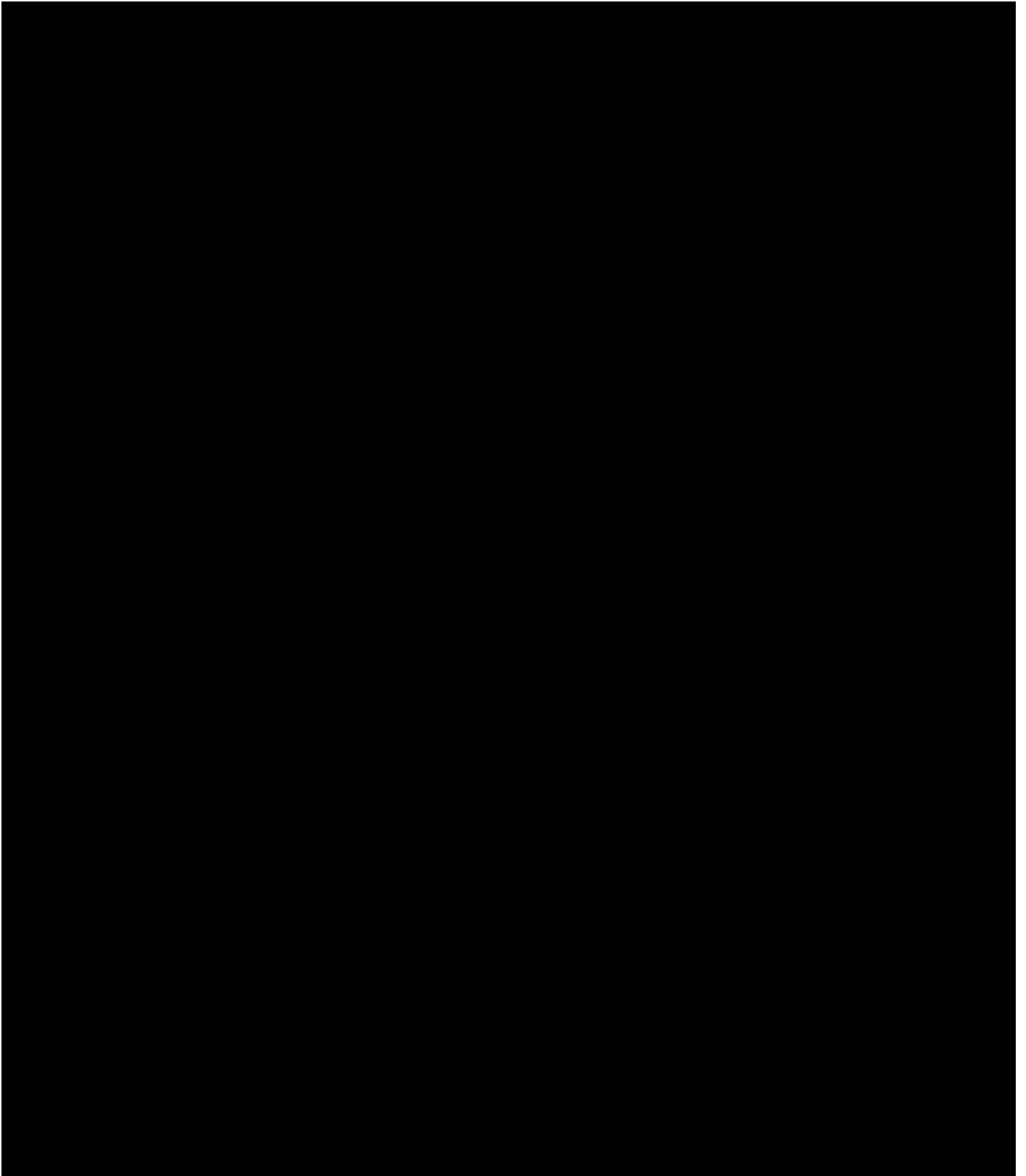
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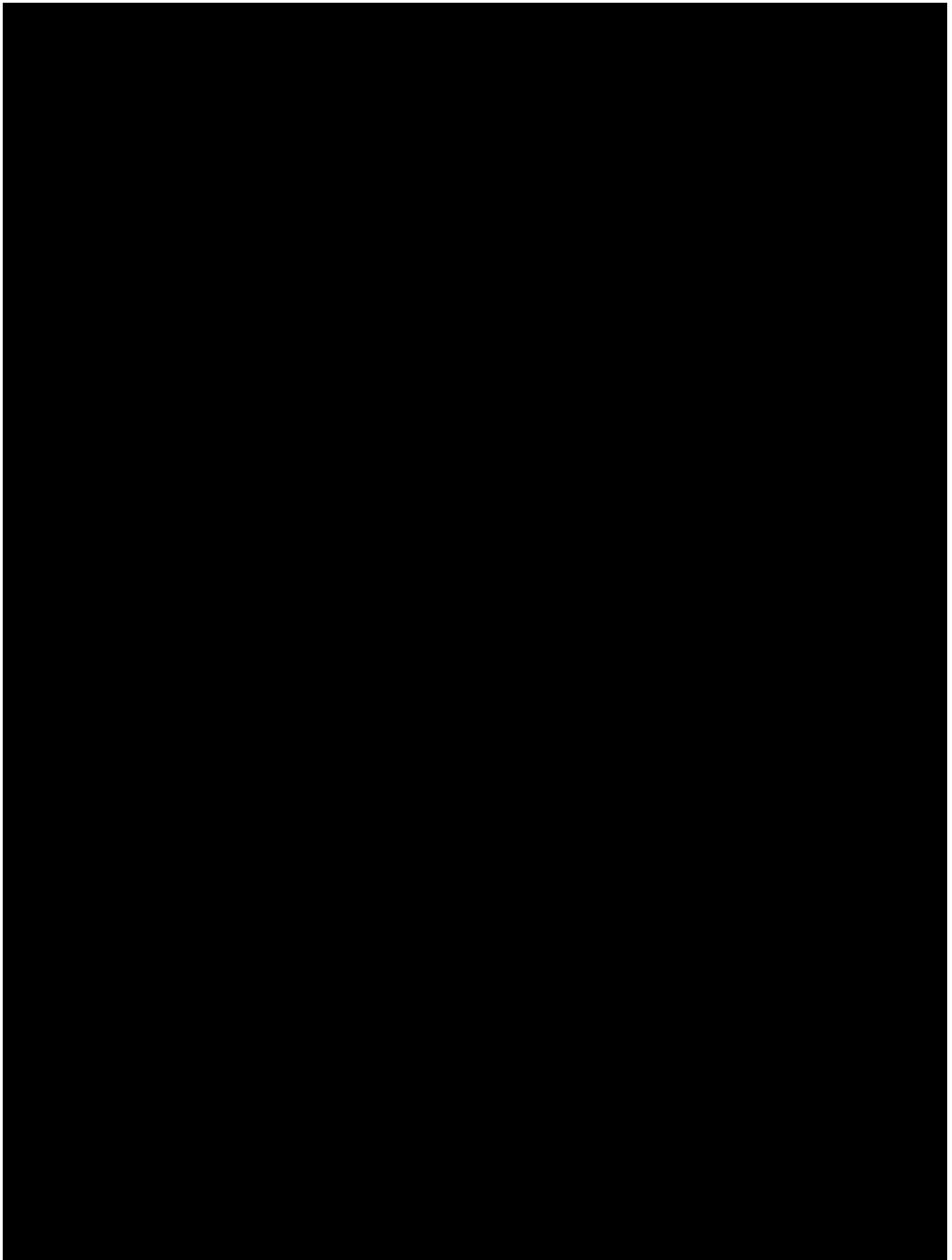
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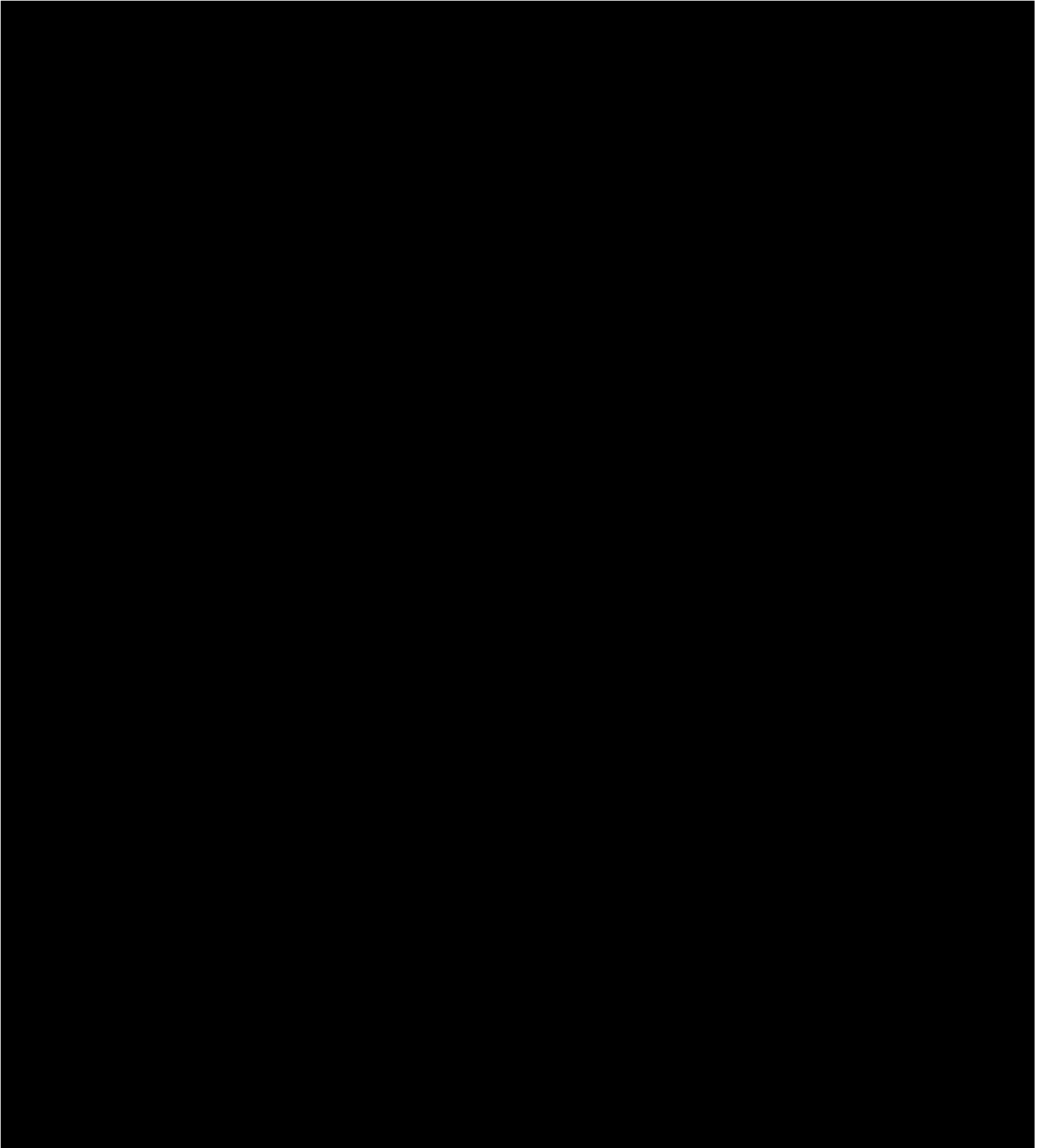
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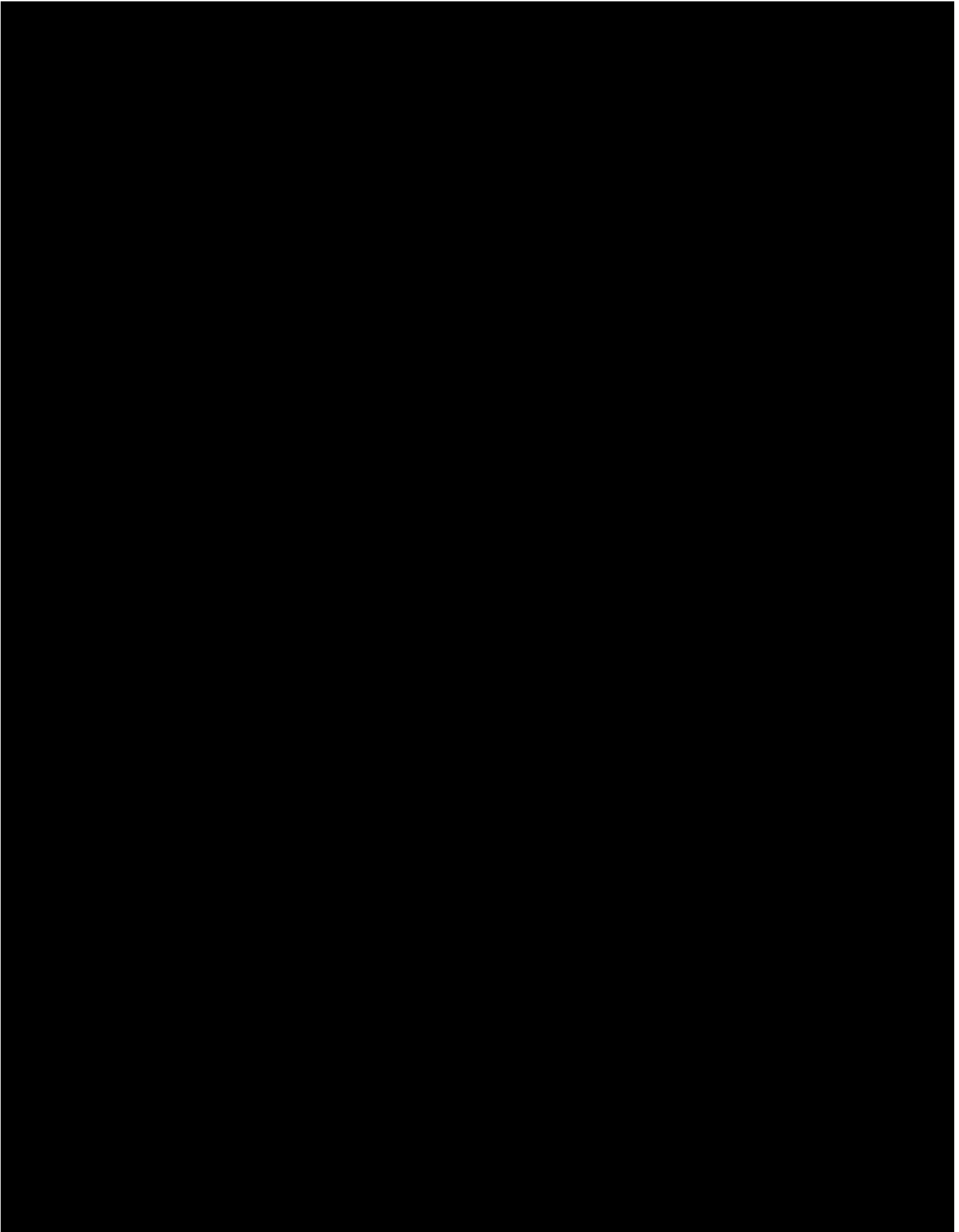


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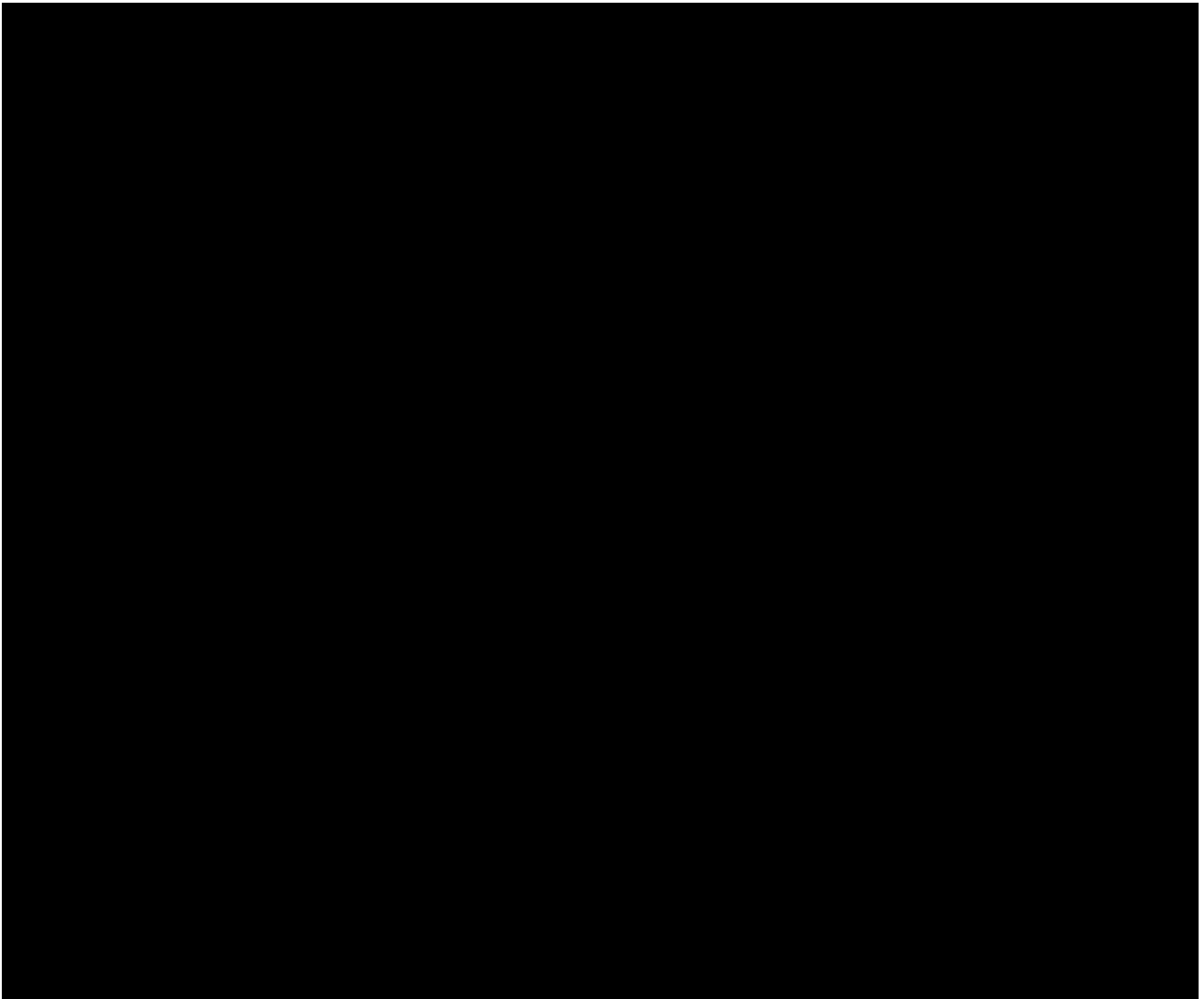
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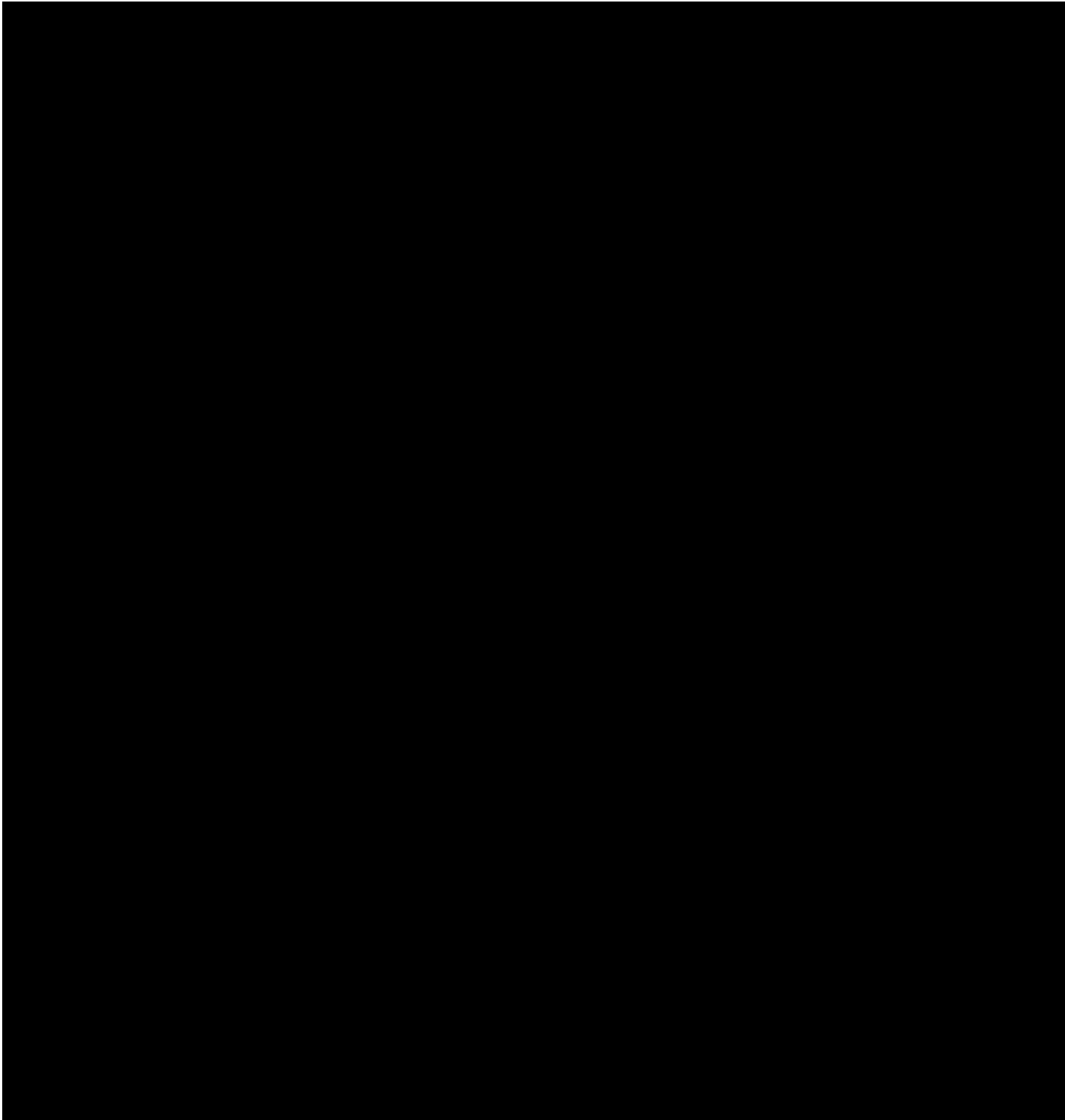
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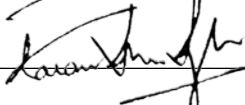
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Executed in Toronto, Canada this 6th day of January 2026.


Karansher Singh, Ph.D.