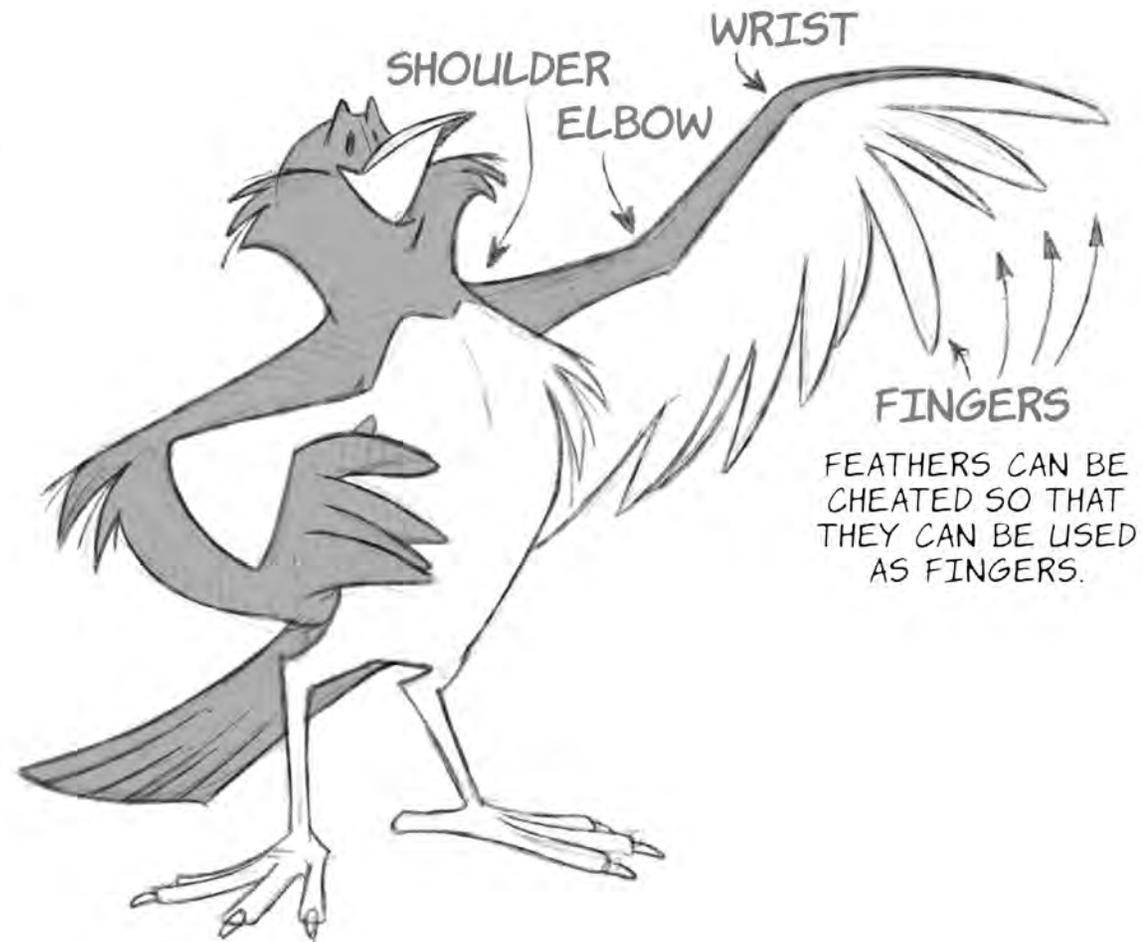


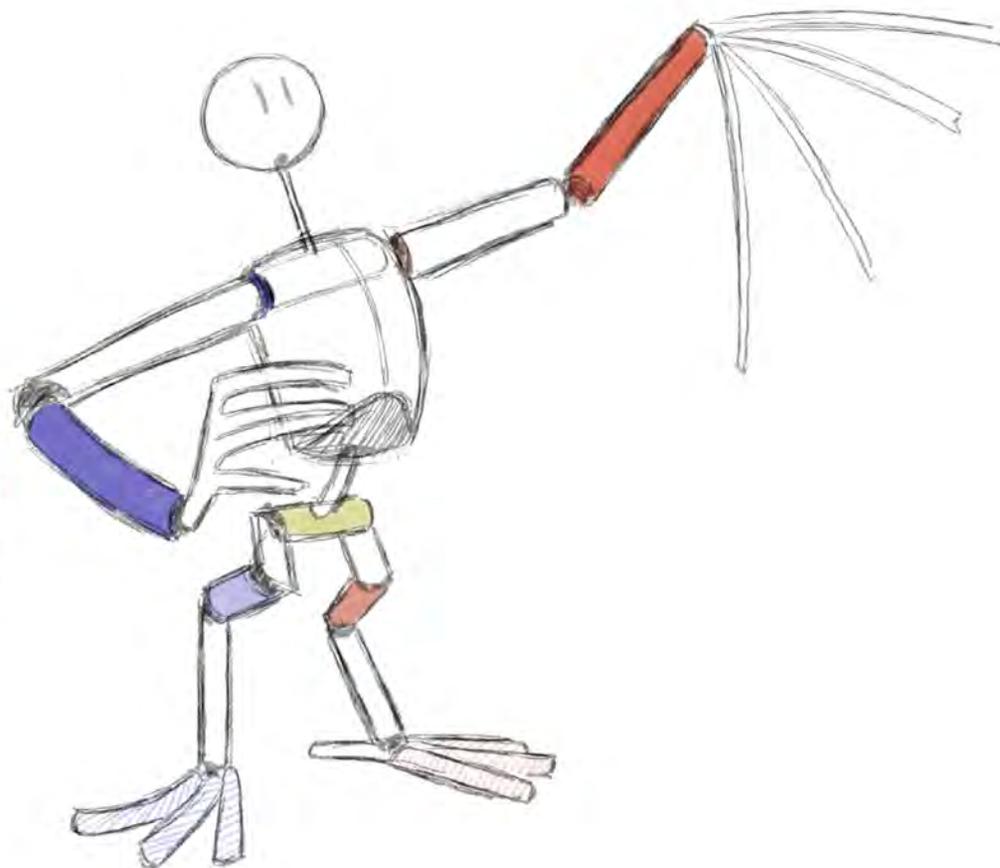
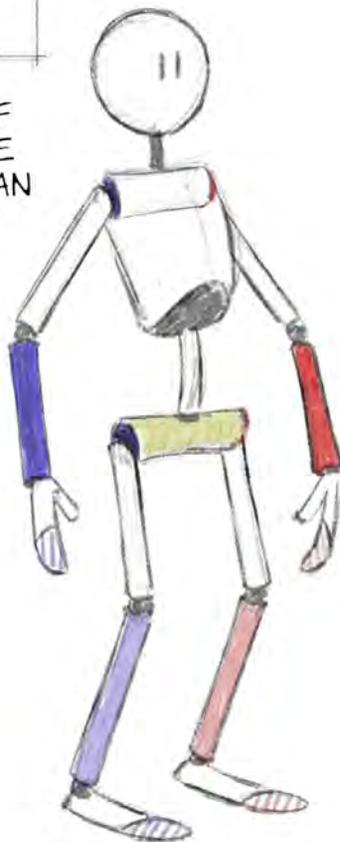
BIRD ANATOMY

DIFFERENT PARTS OF
THE BIRD'S WING ARE
EQUIVALENT TO HUMAN
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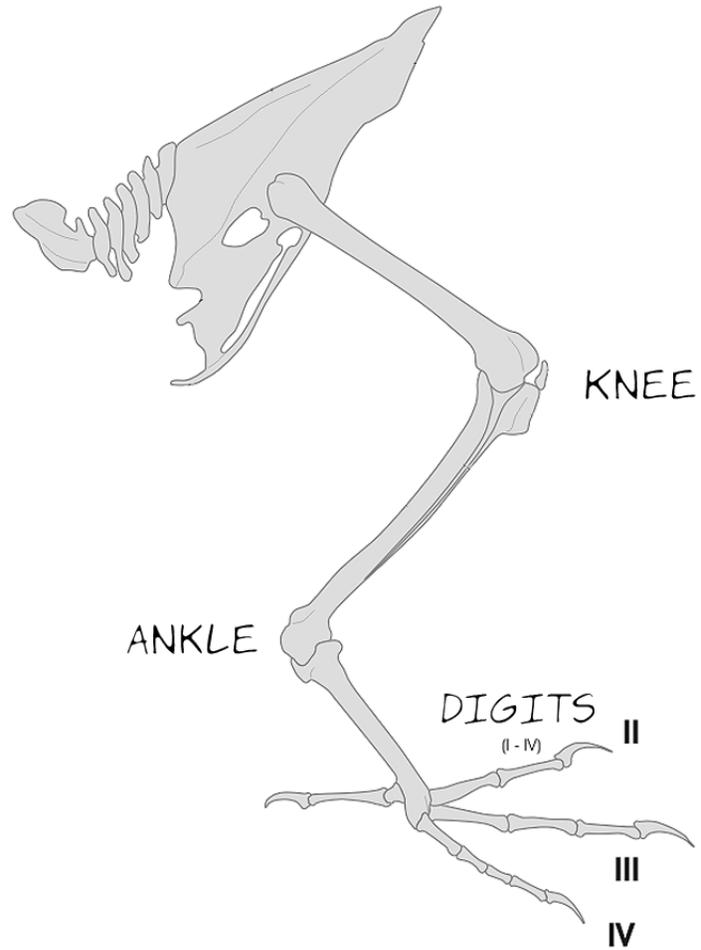
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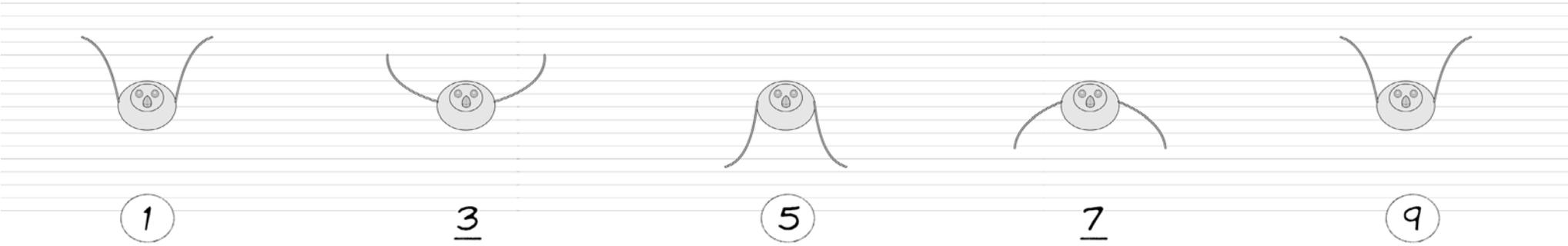
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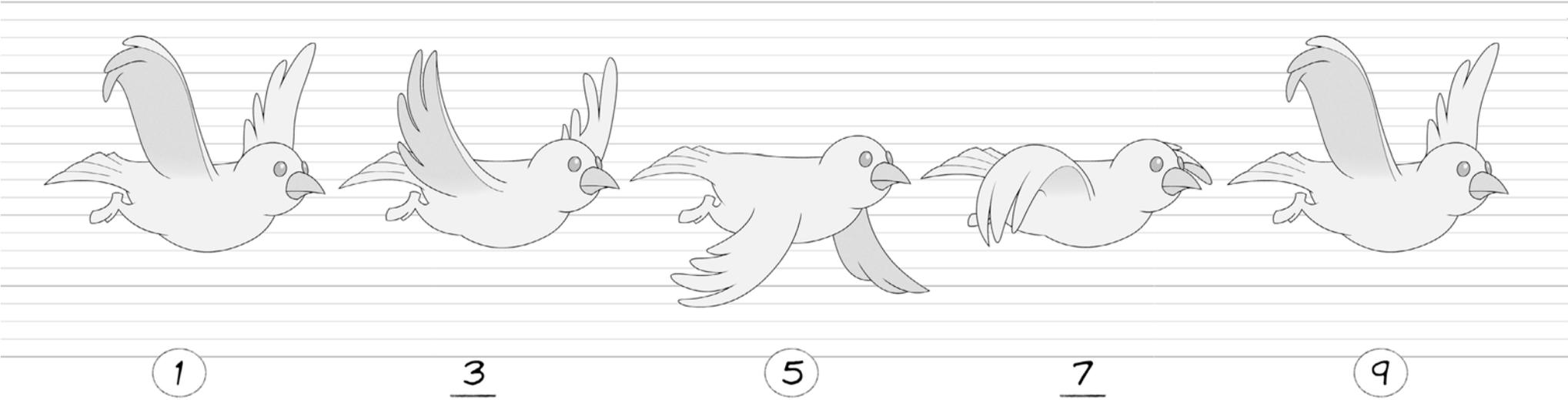
SMALL BIRD FLY CYCLE

THE COMPLETE SERIES OF FRAMES ON 24 FPS
SHOWN FROM THE FRONT VIEW



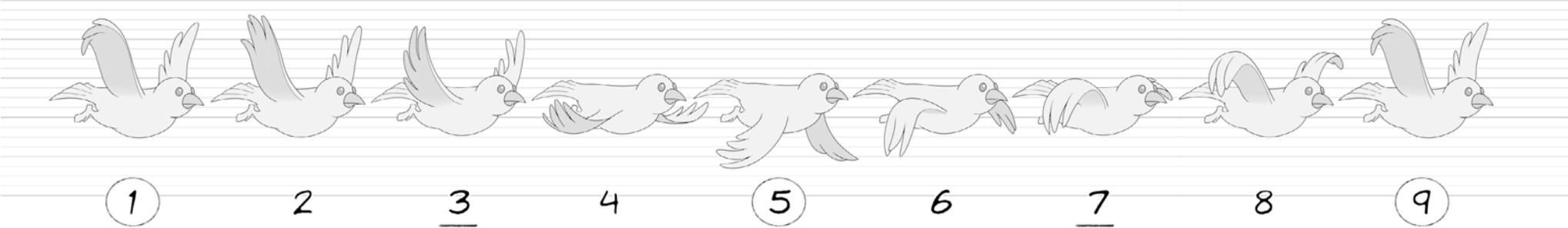
SMALL BIRD FLY CYCLE

A SMALL BIRD, LIKE A SPARROW, HAS A VERY FAST WING BEAT.



SMALL BIRD FLY CYCLE

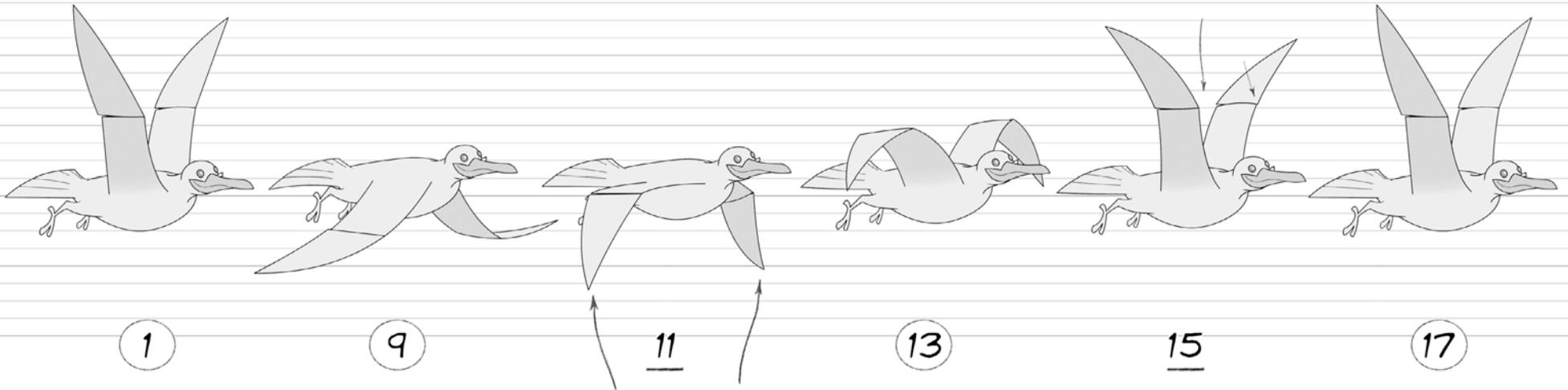
THE COMPLETE SERIES OF FRAMES ON 24 FPS



LARGE BIRD FLY CYCLE

A LARGER BIRD, LIKE A GULL,
HAS A SLOWER WING BEAT.

NOTE THE EXTREME
BREAKDOWN ACTION
ON THE WING EDGE.

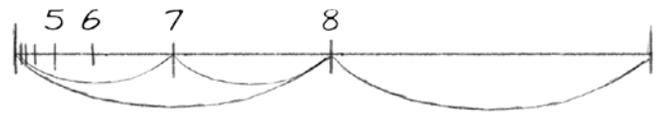
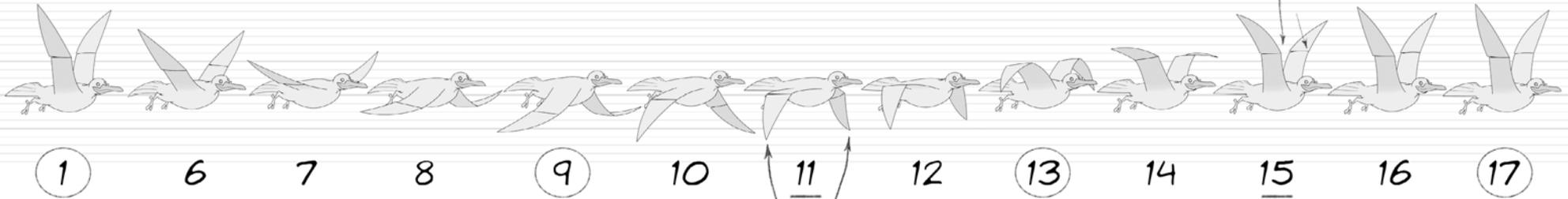


NOTE THE EXTREME
BREAKDOWN ACTION
ON THE WING TIP.

LARGE BIRD FLY CYCLE

A LARGER BIRD, LIKE A GULL,
HAS A SLOWER WING BEAT.

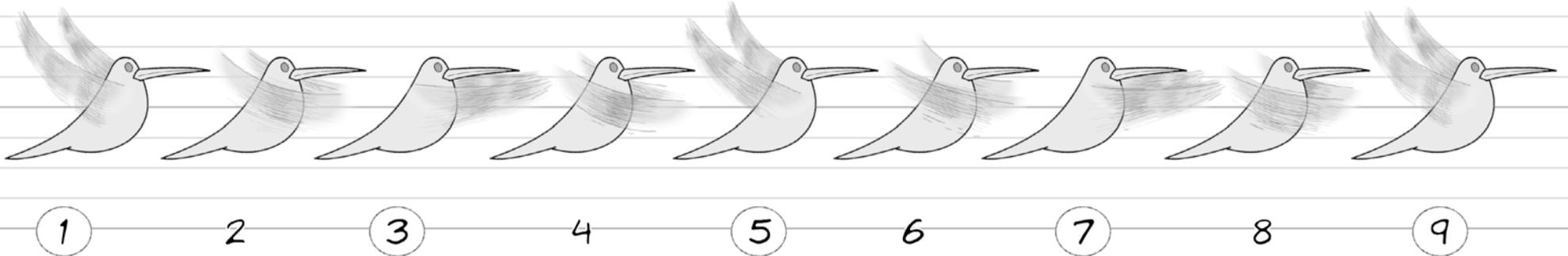
NOTE THE EXTREME
BREAKDOWN ACTION
ON THE WING EDGE.



NOTE THE EXTREME
BREAKDOWN ACTION
ON THE WING TIP.

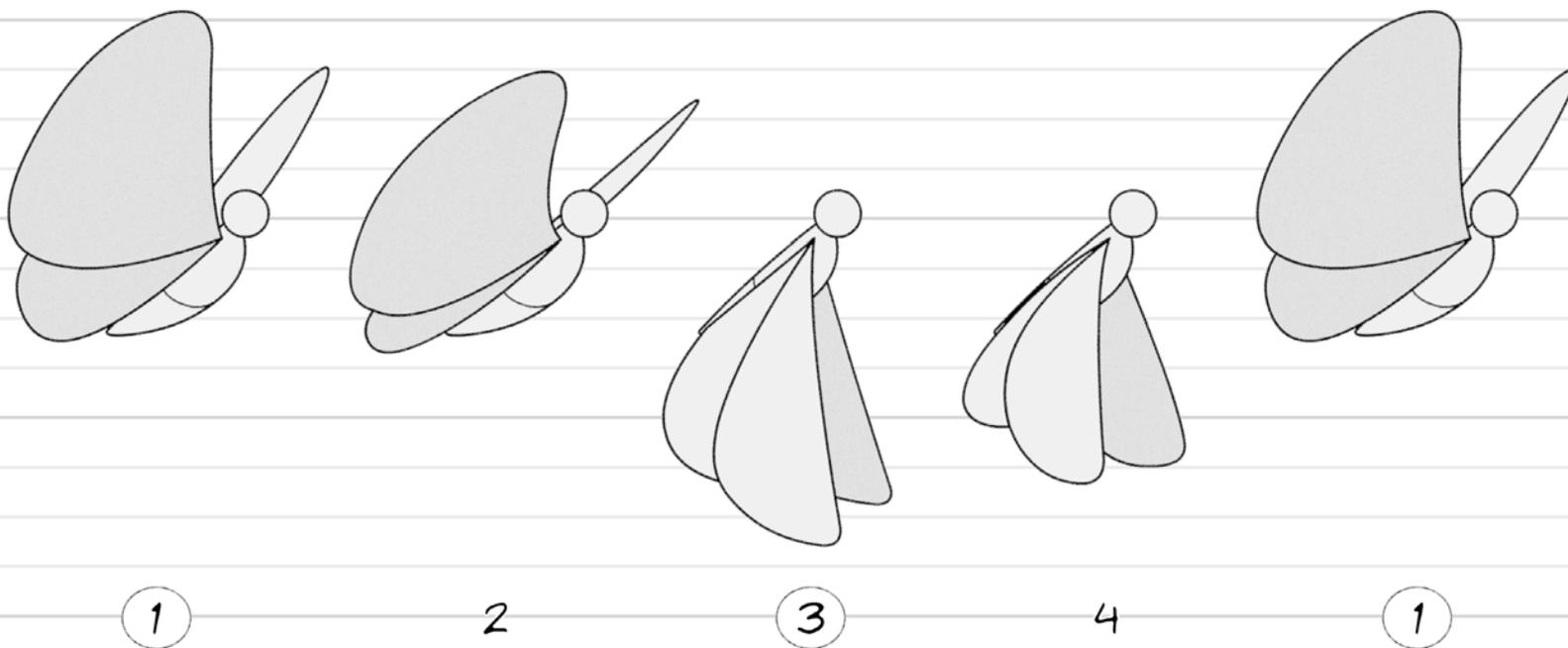
HUMMINGBIRD FLY CYCLE

A HUMMINGBIRD HAS A VERY FAST WING BEAT.
IF POSSIBLE, BLUR THE WINGS SO THAT YOU
ONLY SEE SPEED LINES.



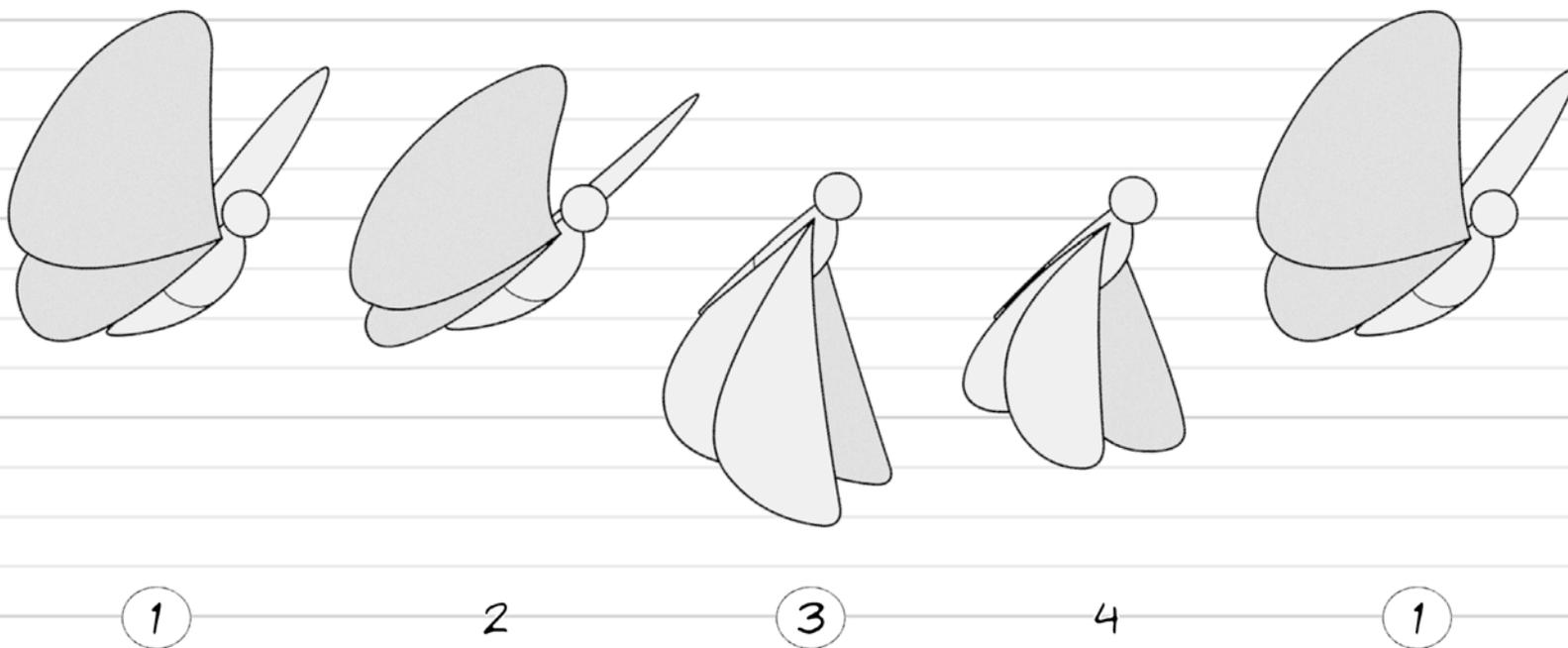
BUTTERFLY FLY CYCLE

THE INBETWEENS ARE SLIGHTLY EASED OUT OF THE EXTREME POSITIONS.
THE FRAMERATE MUST BE FAST: 24 OR 30 FRAMES PER SECOND.



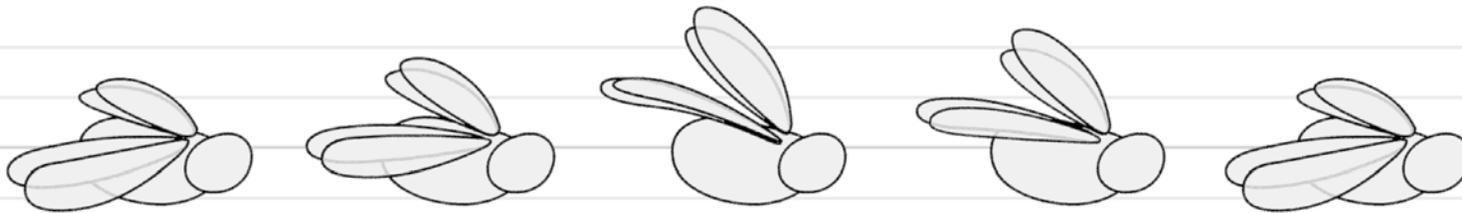
BUTTERFLY FLY CYCLE

FOR MORE REALISM, MOVE THE BODY UP AS THE WINGS DESCEND,
AND MOVE THE THE BODY DOWN AS THE WINGS RISE.



FLY OR BEE FLY CYCLE

THIS IS A VERY FAST ACTION, AND SHOULD APPEAR TO BE TOO FAST TO REALLY SEE. A GOOD BEE OR FLY WING ANIMATION SHOULD HAVE A BLURRY QUALITY.



ONE PROBLEM YOU MAY FACE IF YOU ANIMATE THIS LITERALLY IS THAT THE BLURRY SENSATION MIGHT NOT READ, GIVEN THE LIMITED RANGE OF MOTION.

1

2

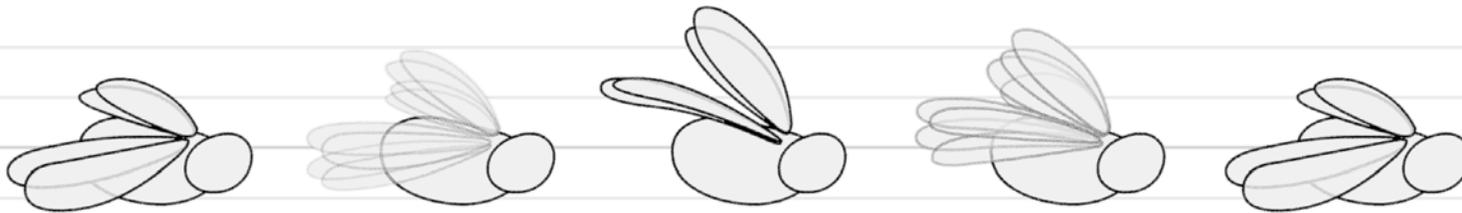
3

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FLY OR BEE FLY CYCLE

ONE POSSIBLE SOLUTION IS TO USE MULTIPLE IMAGES ON PART OR ALL OF THE CYCLE. IN THIS CASE, I'VE CREATED MULTIPLE IMAGES ON THE INBETWEEN FRAMES, SO THAT THERE ARE FOUR WINGS ON EACH SIDE, INSTEAD OF TWO.



1

2

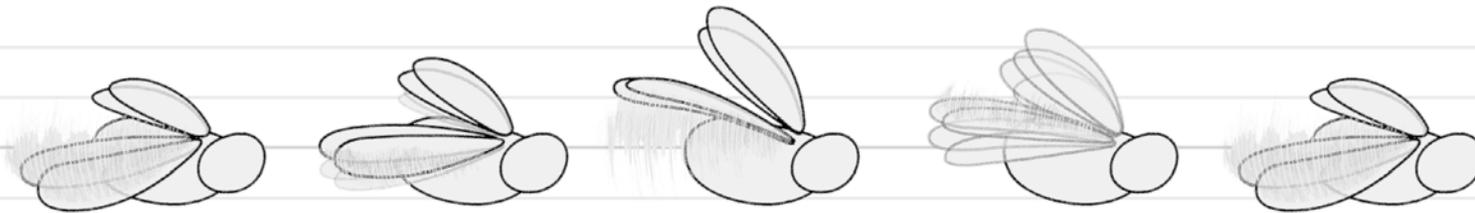
3

4

1

FLY OR BEE FLY CYCLE

ANOTHER POSSIBLE SOLUTION IS TO USE SPEED LINES TO CREATE THE IMPRESSION OF A MOTION BLUR. IN THIS EXAMPLE I'VE ADDED THE SPEED LINES TO THE PREVIOUS VERSION, WHICH USED MULTIPLE IMAGES OF THE WINGS ON THE INBETWEENS.



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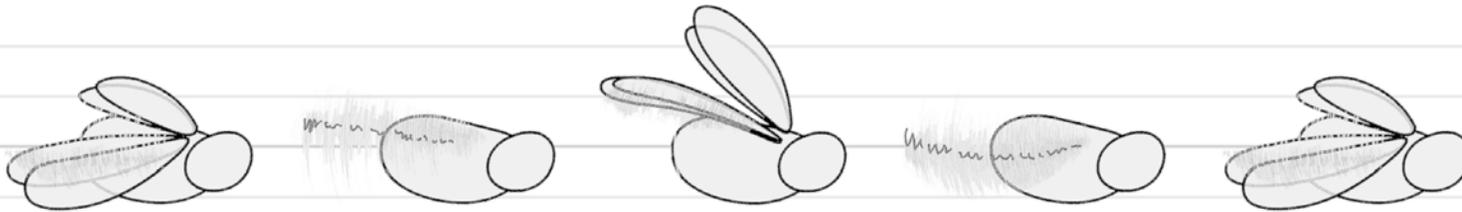
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FLY OR BEE FLY CYCLE

ANOTHER POSSIBLE SOLUTION IS TO REPLACE ALL OR SOME OF THE WING IMAGES WITH SPEED LINES, CREATING THE IMPRESSION OF EXTREME MOTION BLUR. IN THIS EXAMPLE, I'VE JUST REMOVED THE INBETWEEN FRAMES. BUT IF NECESSARY, ALL FOUR COULD BE REPLACED WITH SPEED LINES FOR THE FASTEST IMPRESSION.



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DRAGON FLY CYCLE



DRAGON FLY CYCLE

NOTE THE EXTREME ACTION ON THE WING TIP ON THE BREAKDOWN

NOTE THE FOLDING OF THE WINGS ON BREAKDOWN 25. THEY FOLD IN QUICKLY TO MINIMIZE AIR RESISTANCE.

NOTE THE DELAY ON THE WINGS ON BREAKDOWN 13. THE BODY IS HALFWAY BETWEEN 9 AND 19, BUT THE WINGS FAVOR 9.

NOTE THE FAST TIMING OF THE UP STROKE FROM FRAMES 19 TO 29 (ONLY 10 FRAMES) COMPARED TO THE SLOW DOWN STROKE (18 FRAMES).

