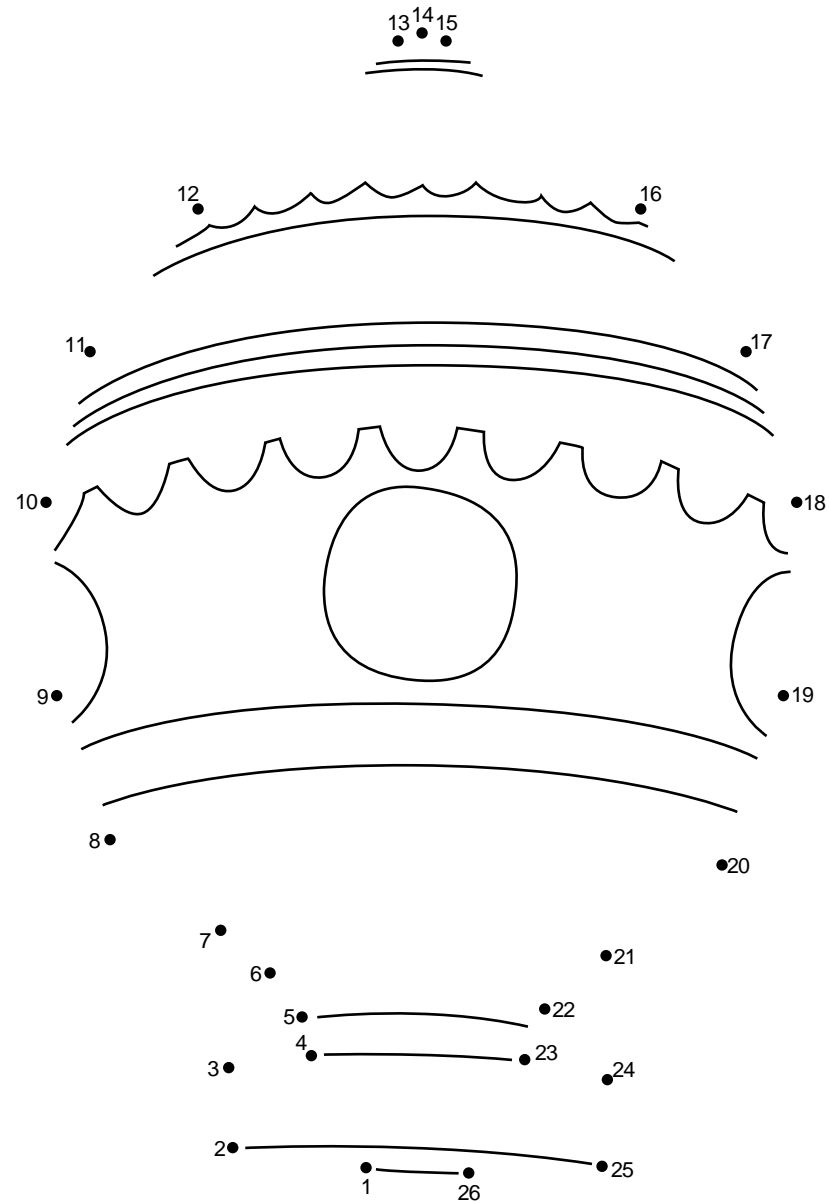
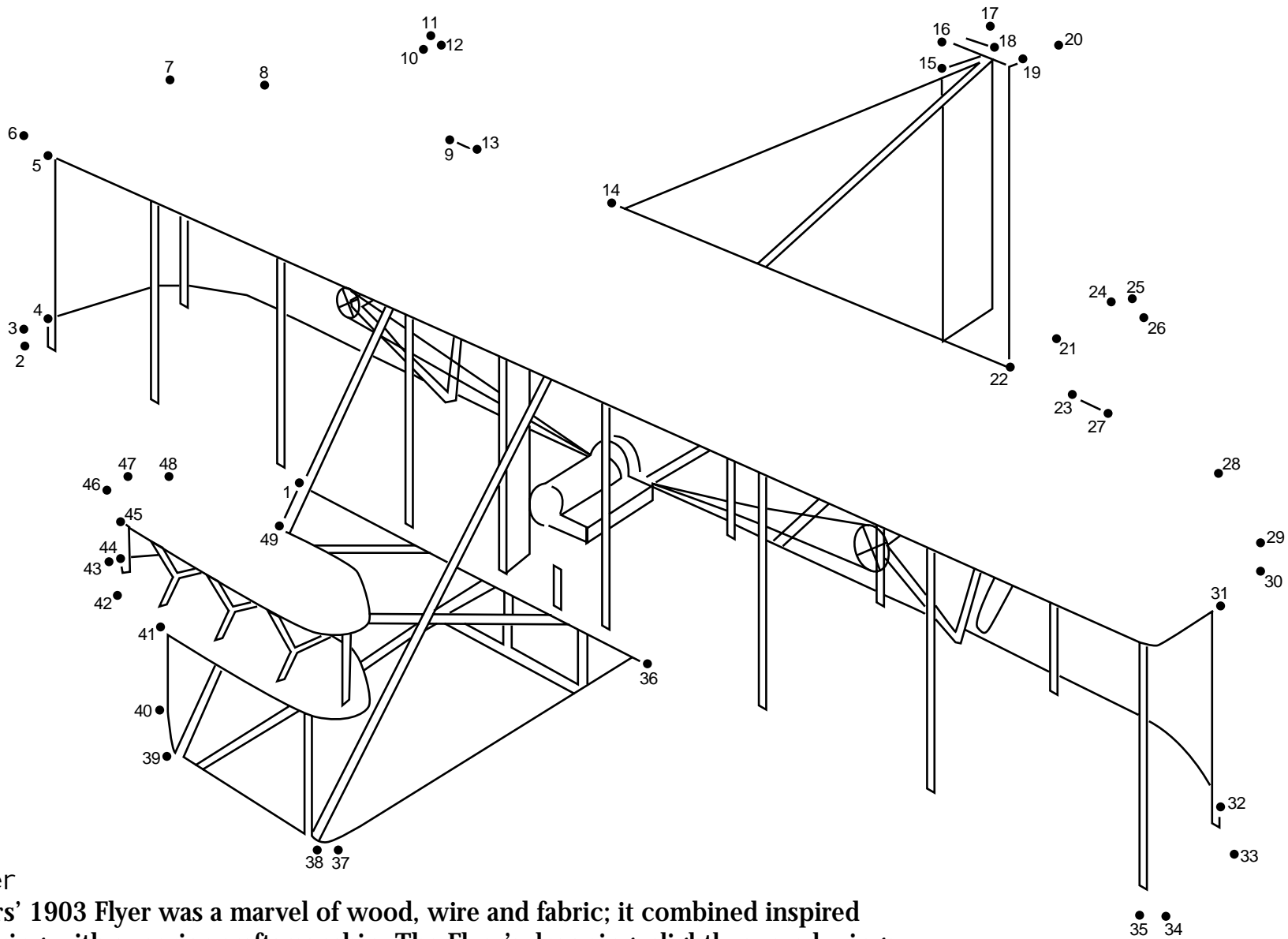


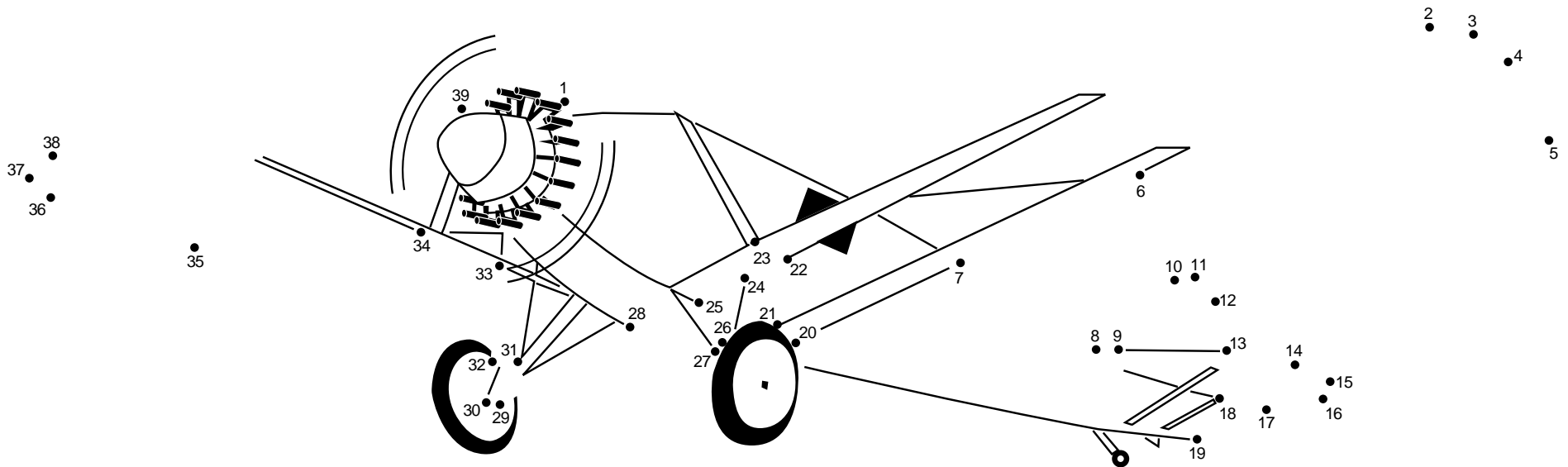
Montgolfier Balloon  
This balloon, built by Joseph and Etienne Montgolfier, was a linen, paper lined balloon. The first living creatures to fly under a Montgolfier hot-air balloon were a sheep, a duck and a rooster. The balloon was launched in Versailles on September 19, 1783 before the French Royal Family, the court and 130,000 spectators. The first manned flight of a Montgolfier hot-air balloon was in Paris on November 21, 1783. Pilatre de Rozier and Francois Laurent (the Marquis d'Arlandes) flew across Paris for 25 minutes and travelled just over five miles from where they had launched.





## The Wright Flyer

The Wright Brothers' 1903 Flyer was a marvel of wood, wire and fabric; it combined inspired design and engineering with superior craftsmanship. The Flyer's drooping, slightly curved wings spanned 40'4". It was powered by a 12-horsepower, 140 pound engine which sat to the right of the center on the lower wing. To compensate for the weight imbalance this caused, the Wrights made the right wings four inches longer than the left ones, increasing their lift capacity, and located the pilot's position on the lower wing to the left of center. In flight, the pilot lay in a prone position. The Wright Flyer flew just four times—a total of 98 seconds—all on December 17, 1903. Later that day, it was damaged by high winds and never again flown.

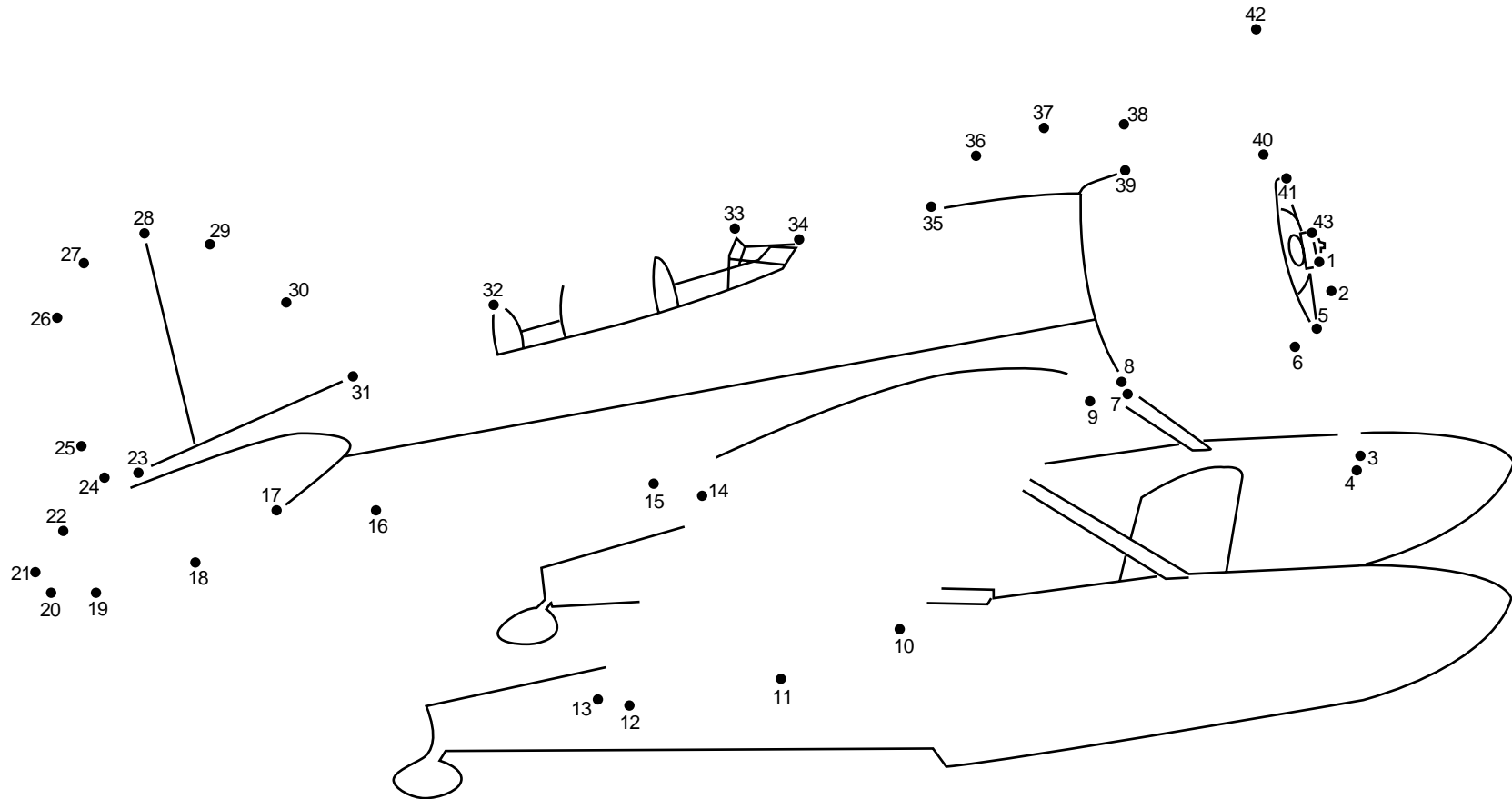


## Spirit of St. Louis

Charles Lindbergh was the first aviator to fly solo across the Atlantic Ocean, arriving in Paris on May 21, 1927, at the end of a 33 1/2 hour, 3,610 mile flight from New York. Lindbergh (raised in Little Falls, Minnesota), 25 years of age and a pilot by profession, had a natural flair for flying and above-average ability as a navigator. His flight not only demonstrated great personal skill and courage, but also his faith in the single 237 horse power Wright Whirlwind engine which powered the specially-built Ryan NYP (New York-Paris) monoplane. The most celebrated single aircraft in the history of aviation was designed and built in just two months. Lindbergh, who supervised construction, insisted that the main fuel tank be in front of the cockpit, to keep it from crushing the pilot against the engine in a case of a crash landing. A periscope was installed to provide forward visibility. The Spirit of St. Louis was little more than a flying fuel tank, containing 450 gallons of fuel in the fuselage and wings.

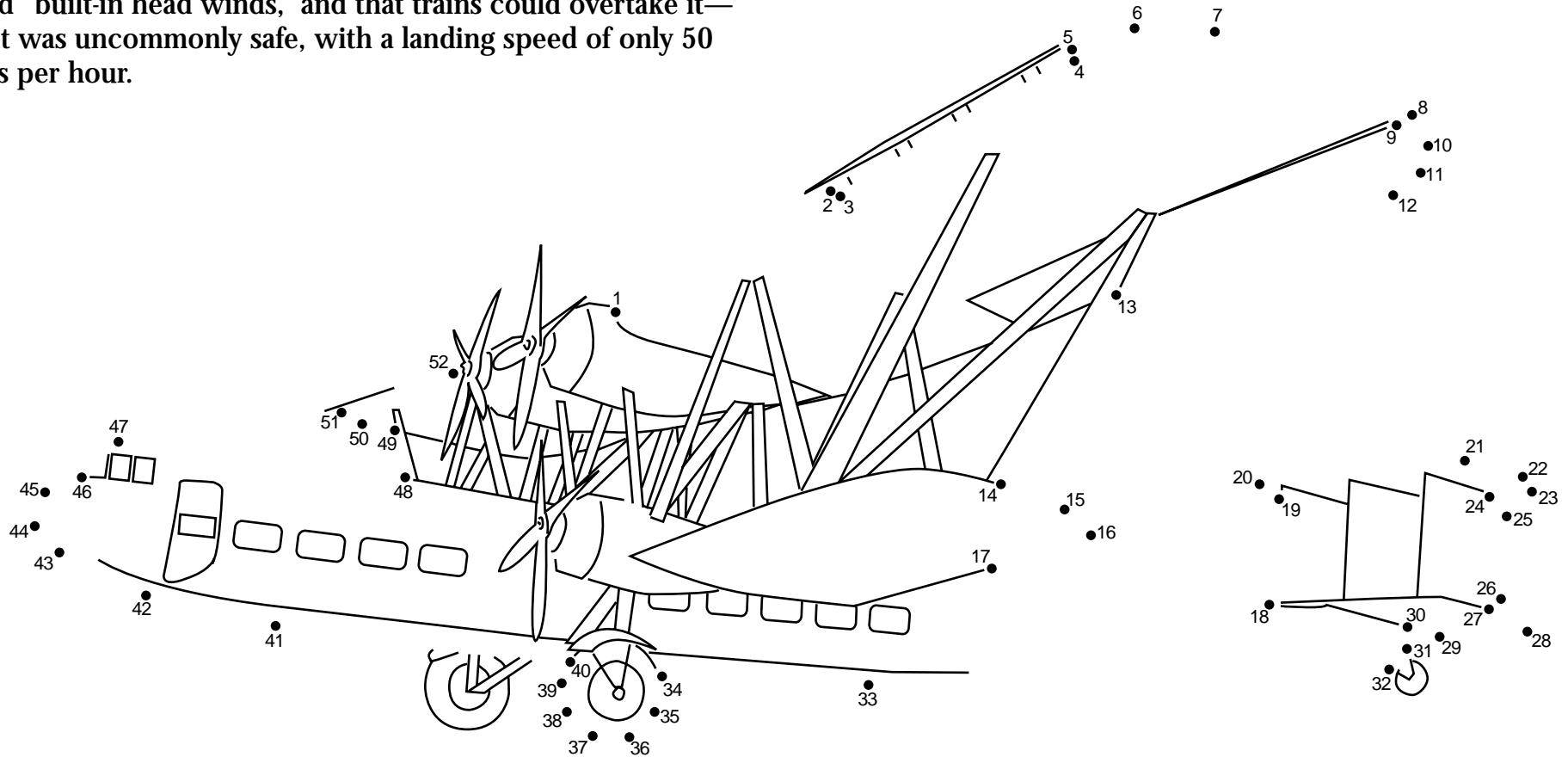
## Lockheed Sirius

Charles and Anne Lindbergh tailored this trim two-seater, powered by a 600 horse power Wright Cyclone, for their 1931 New York-Tokyo flight by adding internal fuel tanks to the wings and pontoons. The additional tanks gave the Sirius a range of 2,100 miles. This flight was a forerunner of today's transpolar flights between North America and Asia.



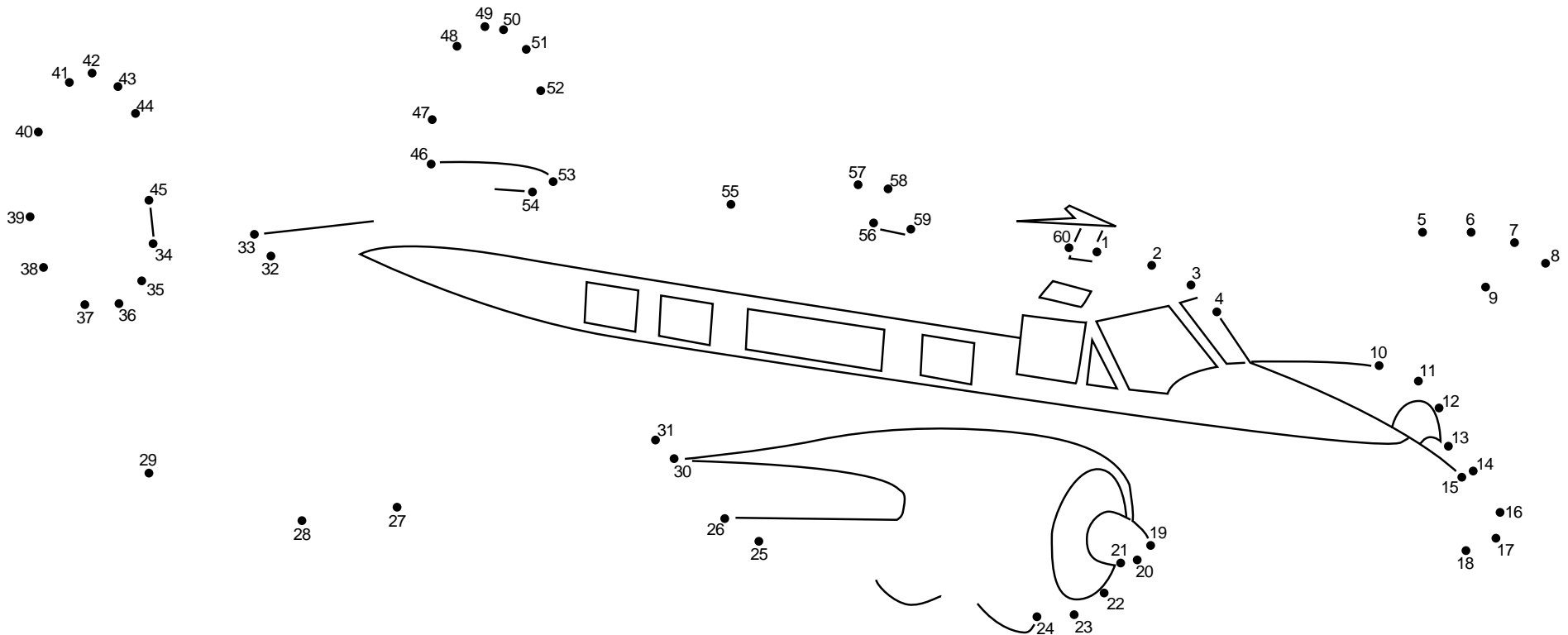
Handley Page H.P. 42

The Handley Page H.P. 42 (in airline service from 1931 to 1941), was a massive four-engined biplane. Two versions were built; the Hannibal which carried 24 passengers and the Hercules which carried 38. The ultimate in elegance, the H.P. 42 had a fuselage nearly as long and wide as a railroad Pullman car and fully as comfortable, with wall-to-wall carpeting and a stand-up bar. Stewards served seven-course meals at tables that were set up between facing seats. Large windows provided an ample view, and the cabin was partially soundproofed—a welcome innovation. The H.P. 42 was exceedingly slow—pilots joked that it had “built-in head winds,” and that trains could overtake it—but it was uncommonly safe, with a landing speed of only 50 miles per hour.



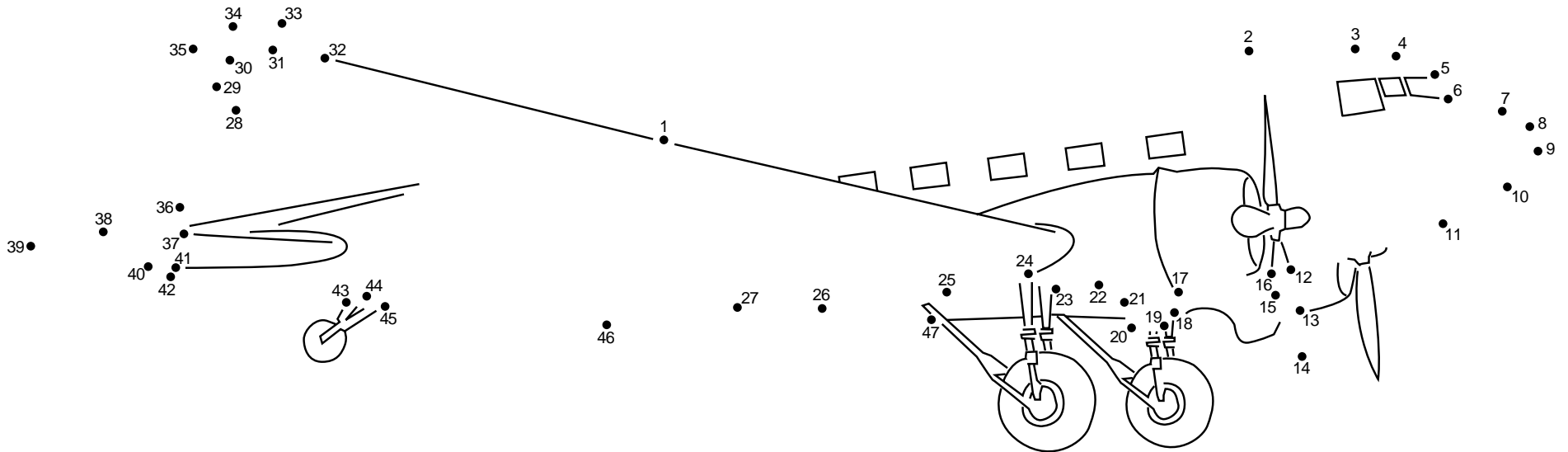
## Beechcraft

The Beech 18 was first flown in January of 1937 and became a standard for business aviation aircraft. It remained in production for over 32 years with over 32 variations. The Beech 18 combined low operating costs, cabin comfort and safety comparable to airliners, ability to operate from small unimproved airports (grass runways) and ease of maintenance. The original Beech 18s had a cruise speed of 196 mph and a range of just over 1,000 miles. It cost approximately \$30,000. The last Beech 18 rolled out of the factory on November 26, 1969, it was Beechcraft Super H18 model, had a cruise speed of 220 mph, a range of just over 1,500 miles and cost approximately \$180,000.



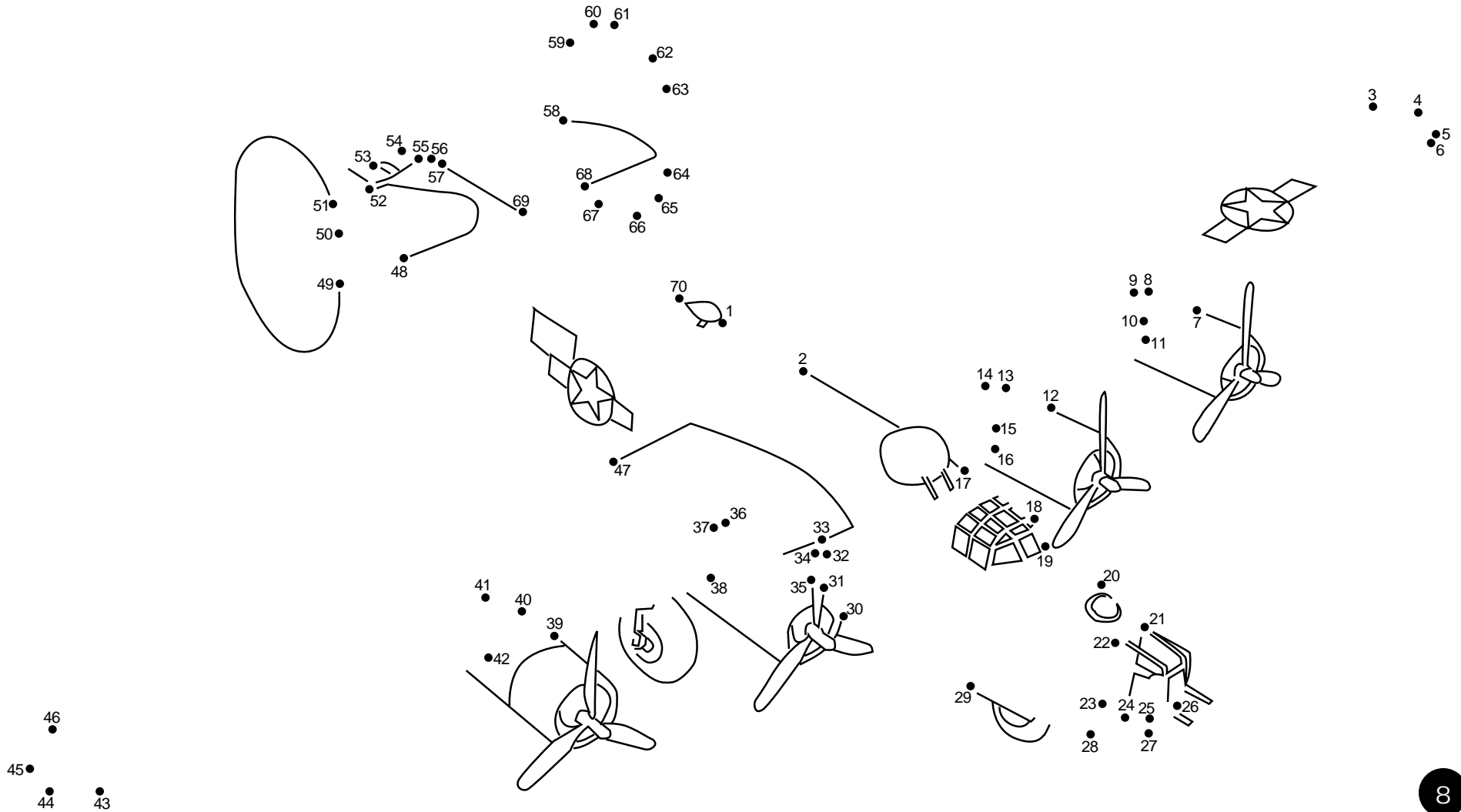
## Douglas DC-3

The DC-3, the most widely used passenger aircraft of its era, incorporated the snub-nosed prow and swept-back wings that would characterize most airliners for decades to come. Its wing flaps reduced landing speed to a safe and comfortable 64 miles per hour. The DC-3 performed yeoman service during World War II, as military-transport known in the United States Army as the C-47. Of the nearly 11,000 DC-3s and military equivalents Douglas made, hundreds were still in service into the 1980s. The all-time champion DC-3 logged more than 50,000 hours in the air for Eastern Air Lines after its delivery in 1939. In 1952 it was sold to North Central Airlines and flew until 1965, when it was retired from regular service. During its 36 years of service it had flown nearly 85,000 hours, the equivalent of almost 10 full years in the air, wore out 550 tires, 25,000 spark plugs and 136 engines.



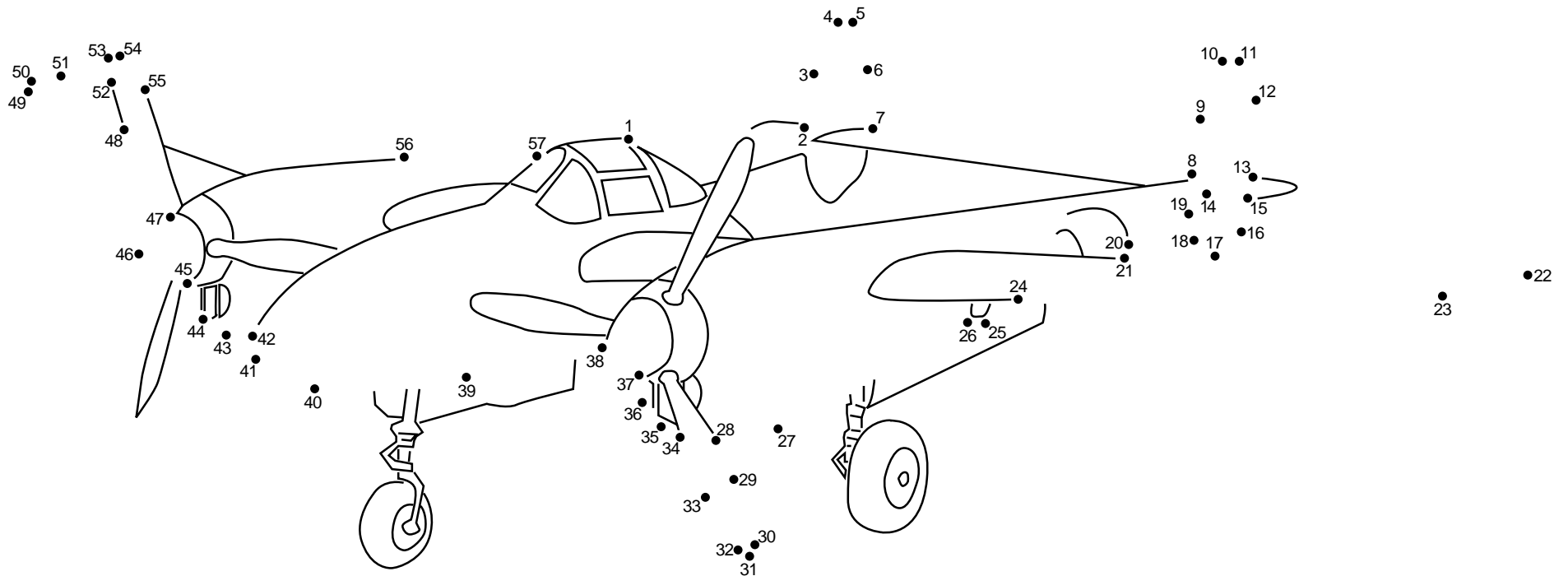
## Consolidated B-24 Liberator

The Consolidated B-24 Liberator was built in greater numbers than any other American plane of World War II—18,188. The B-24 was manned by a crew of 10 and carried a 8,800-pound bombload. Powered by four 1,200-horse power Pratt & Whitney radial engines, it had 10 defensive machine guns, had a top speed of 290 miles per hour and a range of 2,100 miles. Its most distinctive feature was its slender 110-foot-long wing, which housed tanks holding 2,364 gallons of fuel and the main landing gear, which folded up between the engines.

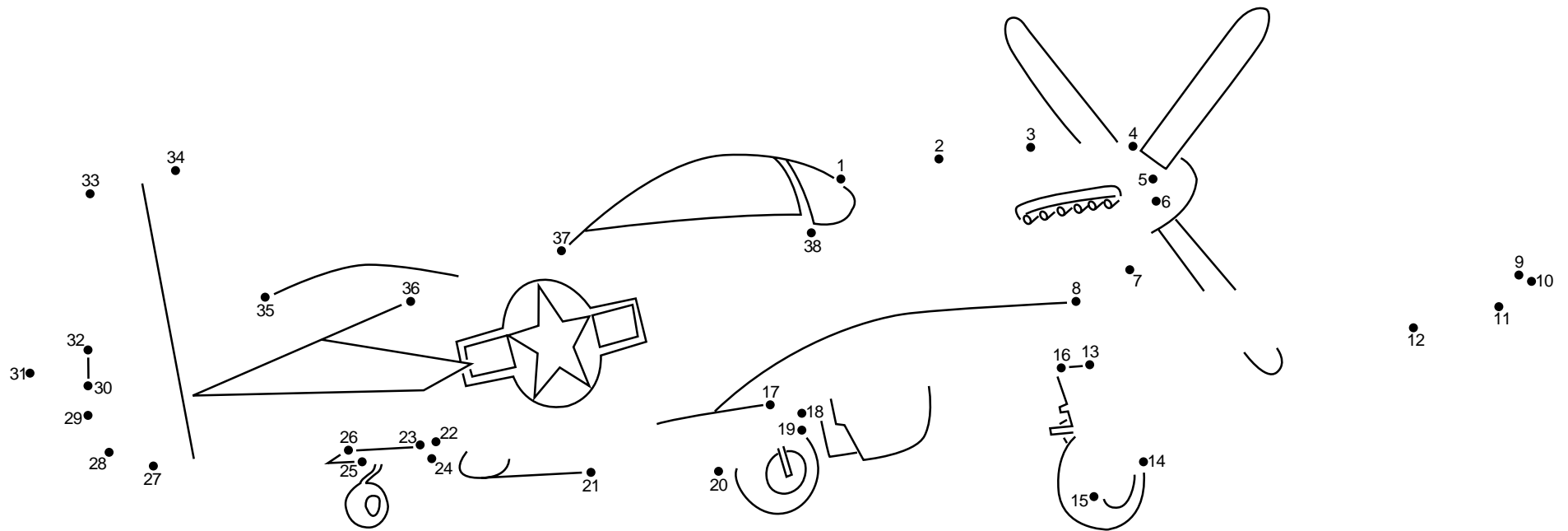




Lockheed P-38 Lightning Fighter  
Powered by two 1,425-horse power  
liquid-cooled engines, the P-38 had a top  
speed of 414 miles per hour and carried  
a 20-mm cannon and four machine guns  
in its nose. Designed as a high-altitude  
interceptor, the P-38 shot down more  
Japanese planes during World War II  
than any other U.S. fighter.

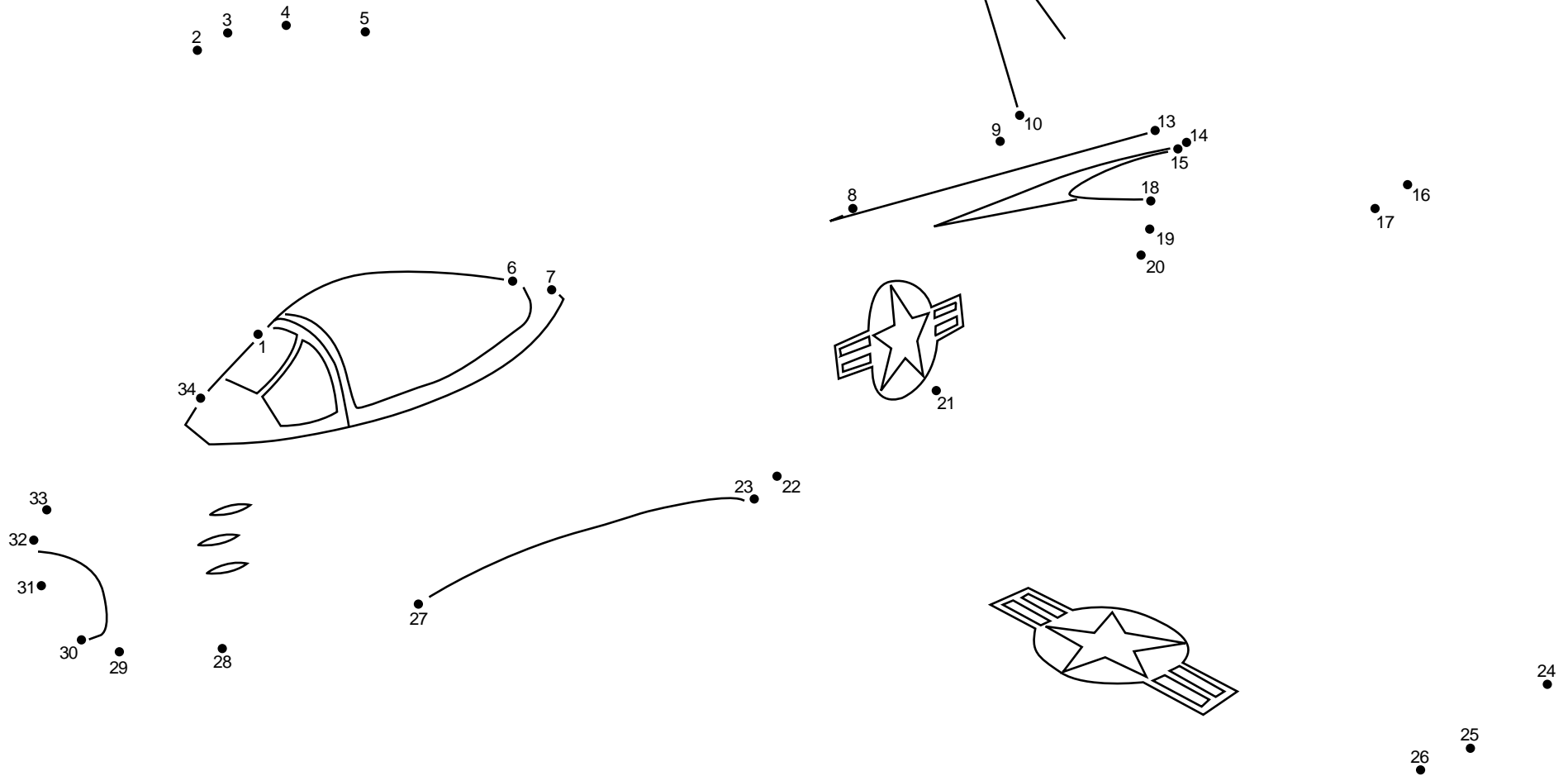


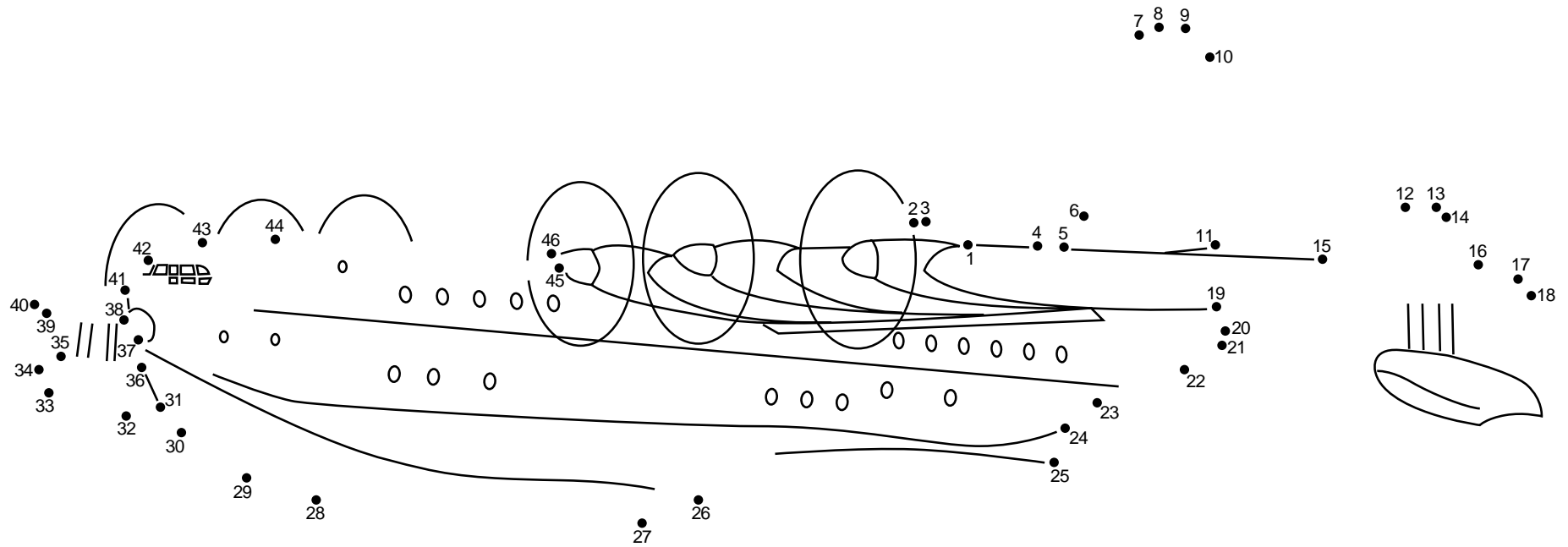
North American P-51 Mustang  
Six wing-mounted machine guns, a top speed of 437 miles per hour and unmatched maneuverability made the P-51 a brilliant fighter. The Mustang was one of the most famous planes of World War II with more than 15,000 built.



# North American F-86 — Sabre

One of the classic jet fighters of all time, this swept-wing aircraft was originally designed as a straight-wing carrier plane for the U.S. Navy. Powered by a 5,910 pound-thrust General Electric jet engine, it had a top speed of 693 miles per hour and was armed with six machine guns. Almost 10,000 Sabres were built, and served in the air forces of 31 countries.



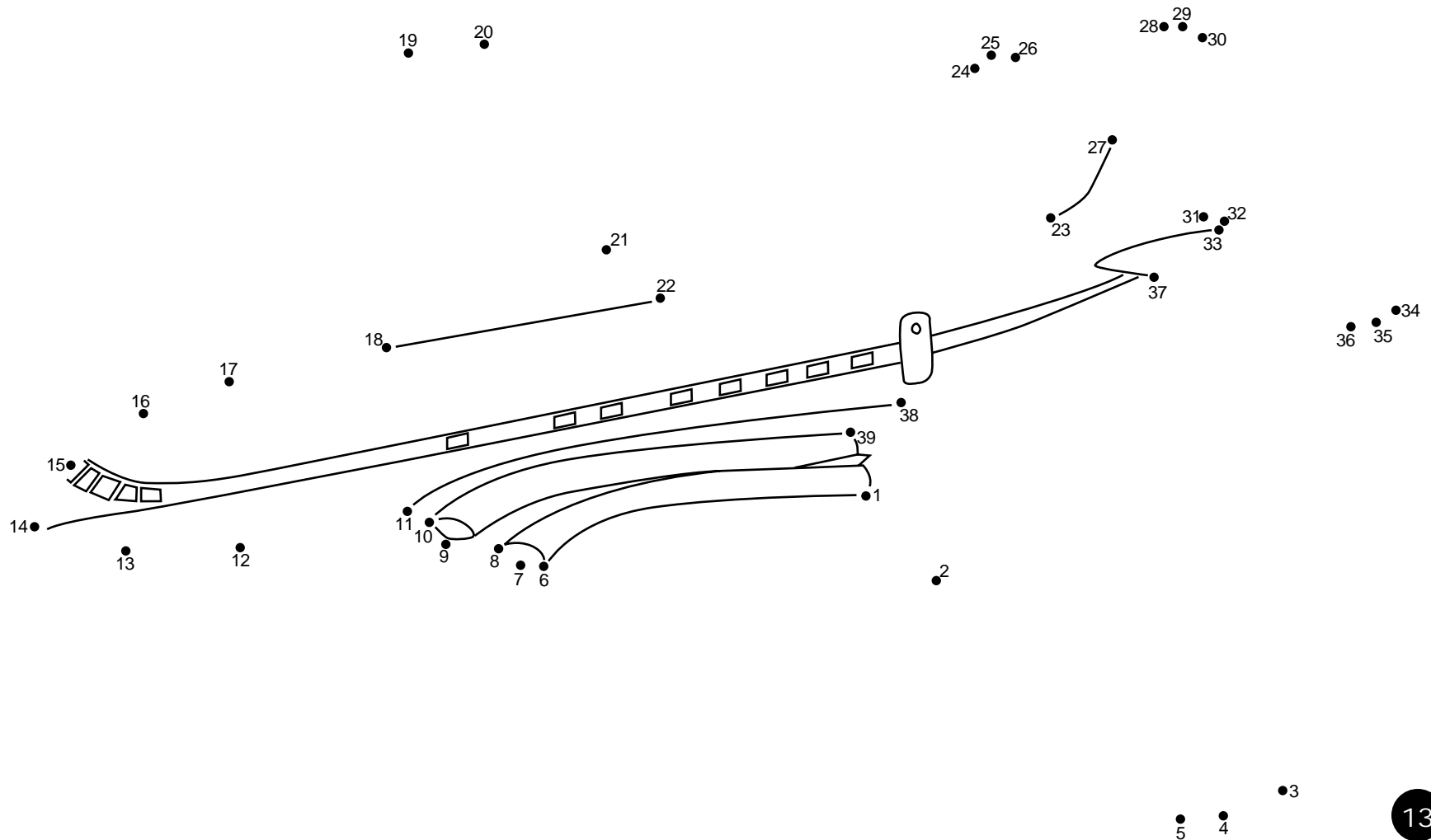


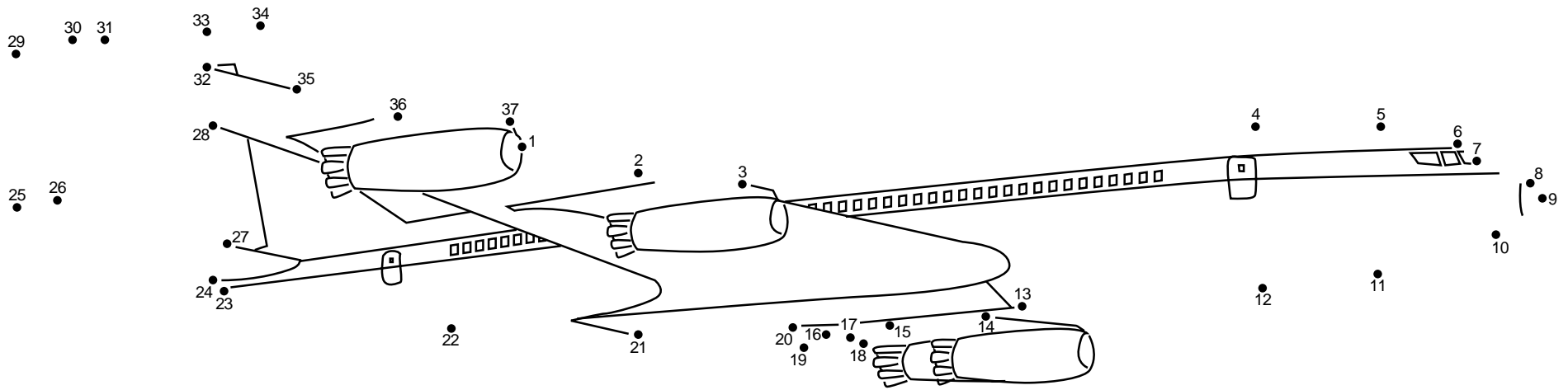
### Saunders-Roe Princess

Perhaps the nearest the civil flying-boat came to post-World War II success was when the Saunders-Roe Princess took to the air on August 22, 1952. This majestic ten-turboprop giant was designed to carry 105 passengers in ocean-liner luxury at 385 miles per hour over trans-Atlantic distances. Unfortunately, the British Overseas Airways Corporation (BOAC) lost interest in marine aircraft and the three Princesses which were built were not put into service.

## De Havilland Comet

With its streamline, 93-foot-long fuselage, its gracefully swept 115-foot wingspan and a cruising speed of just under 500 miles per hour, the Comet ushered in a new era of air travel in 1952. The Comet's four 4,500-pound-thrust turbojet engines made the plane the fastest commercial transport of its day. A fully pressurized fuselage enabled it to fly passengers comfortably through the thin air of the stratosphere, eight miles high. The vibration-free jet engines—and the fact that the Comet flew well above most turbulence—made for a marvelously smooth ride. With wing tanks holding 7,500 gallons of fuel the Comet had a range of 1,750 miles.



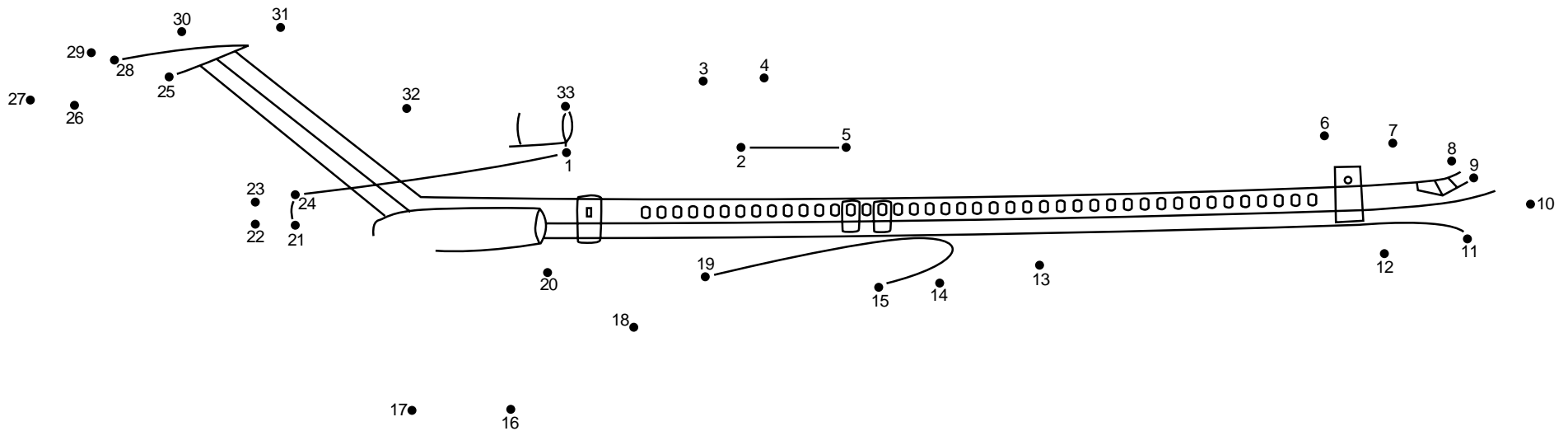


### Boeing 707

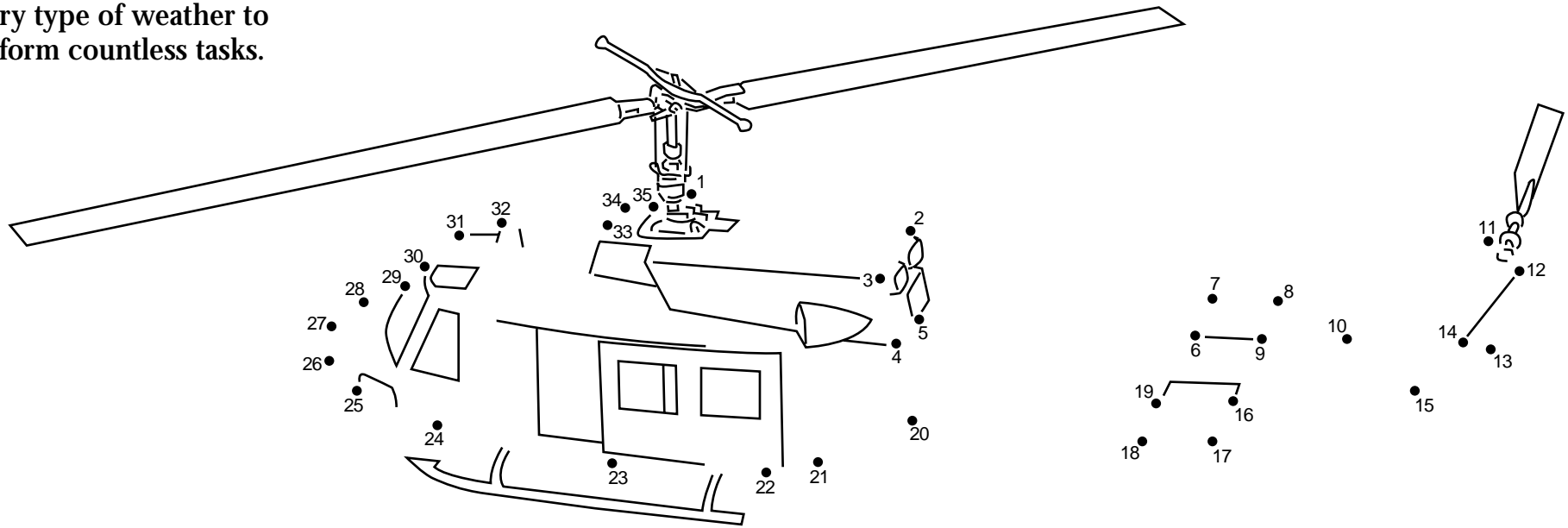
The 707's 145-foot-long fuselage, 130-foot wingspan and 257,000-pound weight made it the world's largest airliner when it appeared in 1958. Its cruising speed of 535 miles per hour made it the fastest as well. The 707's cabin can accommodate up to 130 passengers. Its wings, designed to flex in rough air, were swept back 35 degrees and contained tanks holding 17,000 gallons of fuel, enough to fly nonstop across the United States. The engines were mounted beneath the wings which both enhanced the wings' lifting efficiency and contributed to easy engine maintenance. The 707 quickly became the world's most widely used long-range airliner. By 1962, just four years after their introduction, 707s had logged 1.7 million hours in the air and carried 30 million travelers 750 million passenger miles.

## Boeing 727

The 727 was the first American trijet (it is powered by three turbofan engines) and became the world's best selling airliner. The third engine gave the plane extra flexibility in terms of range and safety—an important consideration for the airlines. The first 727 rolled out of the factory on November 27, 1962 and by the time a new generation of airliners was ready to replace it in the early 1980s nearly 2,000 Boeing 727s had been sold or ordered. The 727 quickly acquired a reputation as a pilot's airplane because it handled quickly and easily. The 727 seats up to 131 passengers, cruises at 530 miles per hour and has a range of 2,500 miles.



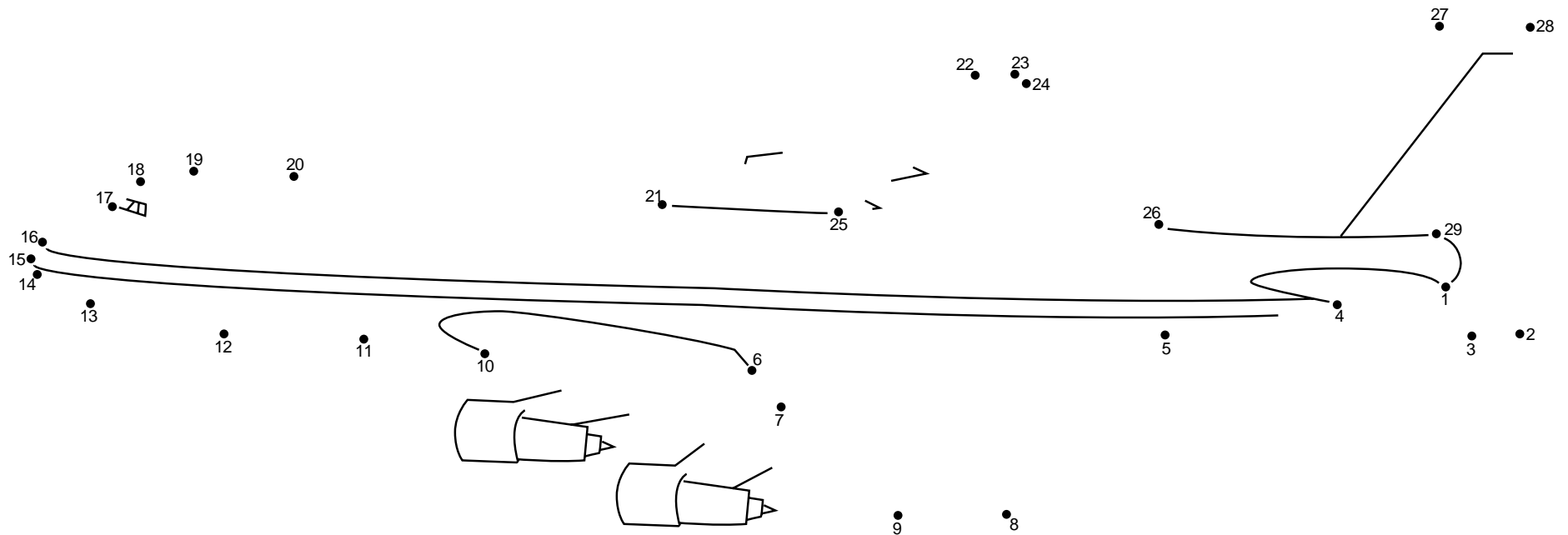
Bell UH-1 — Huey  
The helicopter's military potential first became apparent in the Korean War, but it was not until the Vietnam War that it was fully realized. Of all the military rotorcraft built none is more common than the Bell UH-1, known universally as the Huey. From 1962 onward, thousands of these ungainly craft took to the air daily in every type of weather to perform countless tasks.





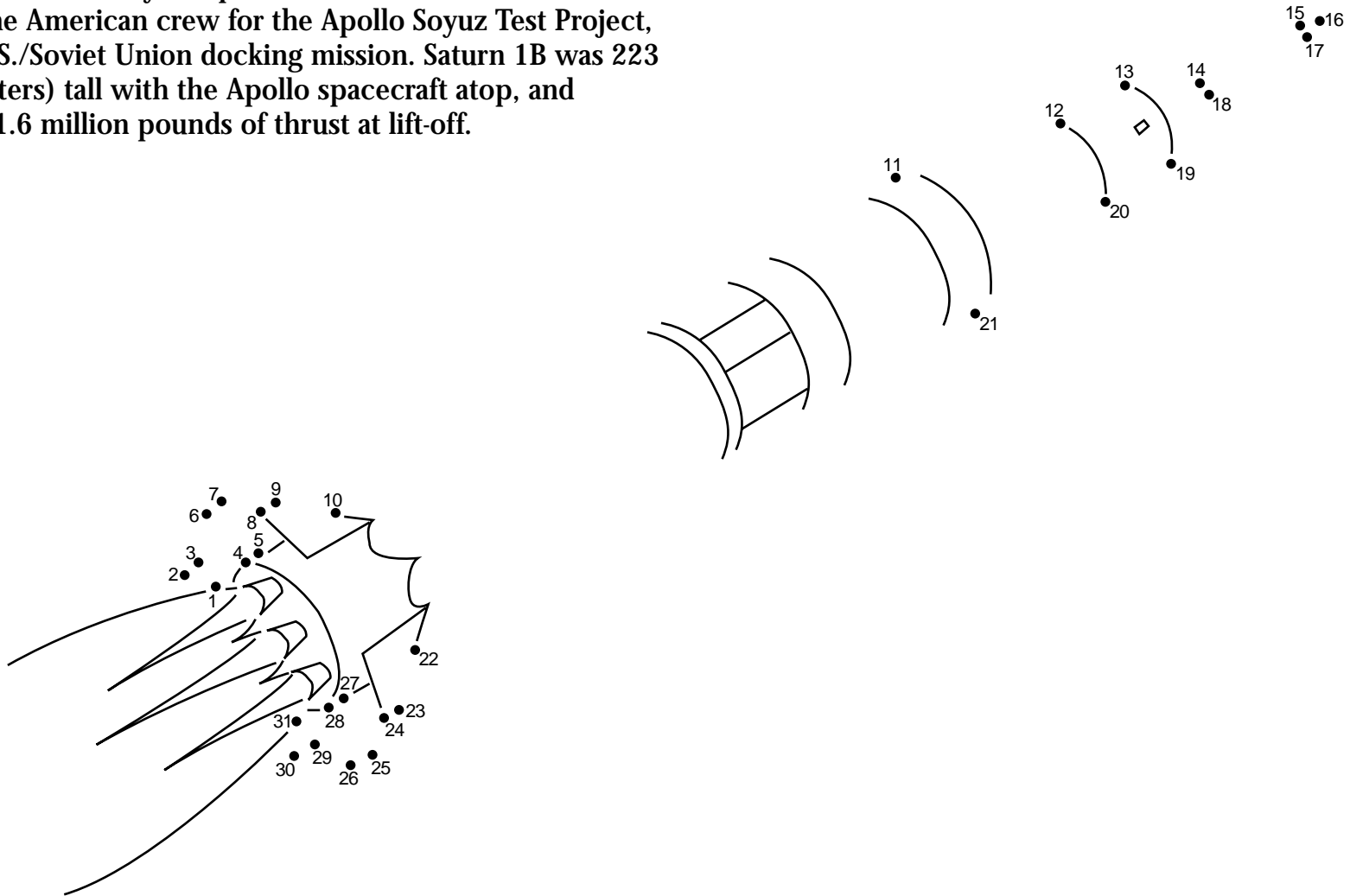
## Boeing 747

The four-engine 747, with its 499-seat capacity, was built for long-range routes. The passenger cabin is over 19 feet wide, its wing span is over 195 feet and it requires nearly an acre of parking space. The 747 has a massive 18-wheel landing gear system to cushion landings and distribute the plane's 390-ton weight evenly on the runway. The first test flight of a Boeing 747 was on February 9, 1969. The 747 cruises at 560 miles per hour and has a range of approximately 8,000 miles.



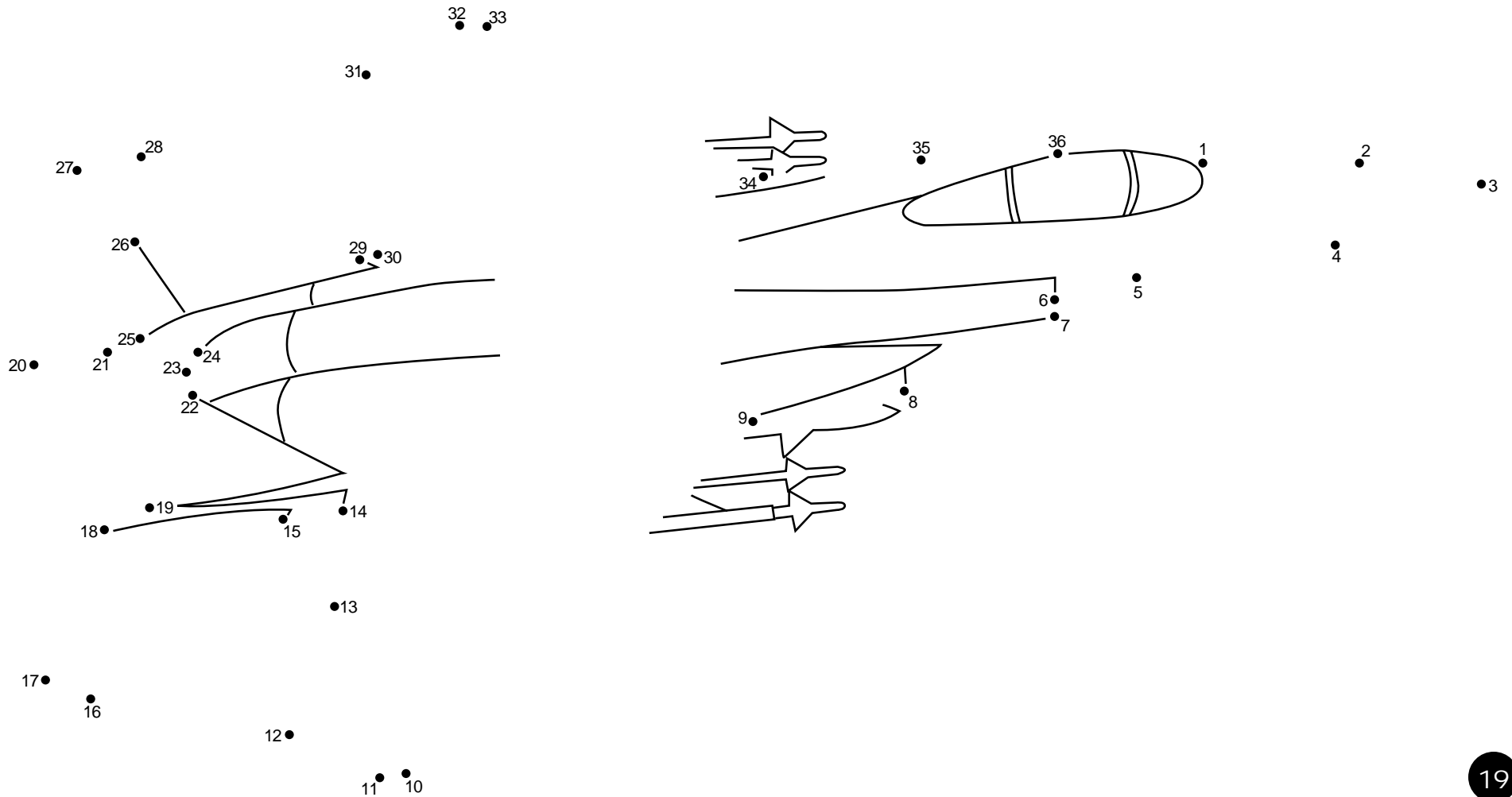
## Saturn 1B

The Saturn 1B was used to launch Apollo lunar spacecraft into Earth orbit to train for manned flights to the Moon. The first launch of a Saturn 1B with an unmanned Apollo spacecraft took place in February 1966. A Saturn 1B launched the first manned Apollo flight, Apollo 7, on October 11, 1968. After the completion of the Apollo program, the Saturn 1B launched three missions to man the Skylab Space Station in 1973. In 1975, it launched the American crew for the Apollo Soyuz Test Project, the Joint U.S./Soviet Union docking mission. Saturn 1B was 223 feet (68 meters) tall with the Apollo spacecraft atop, and developed 1.6 million pounds of thrust at lift-off.



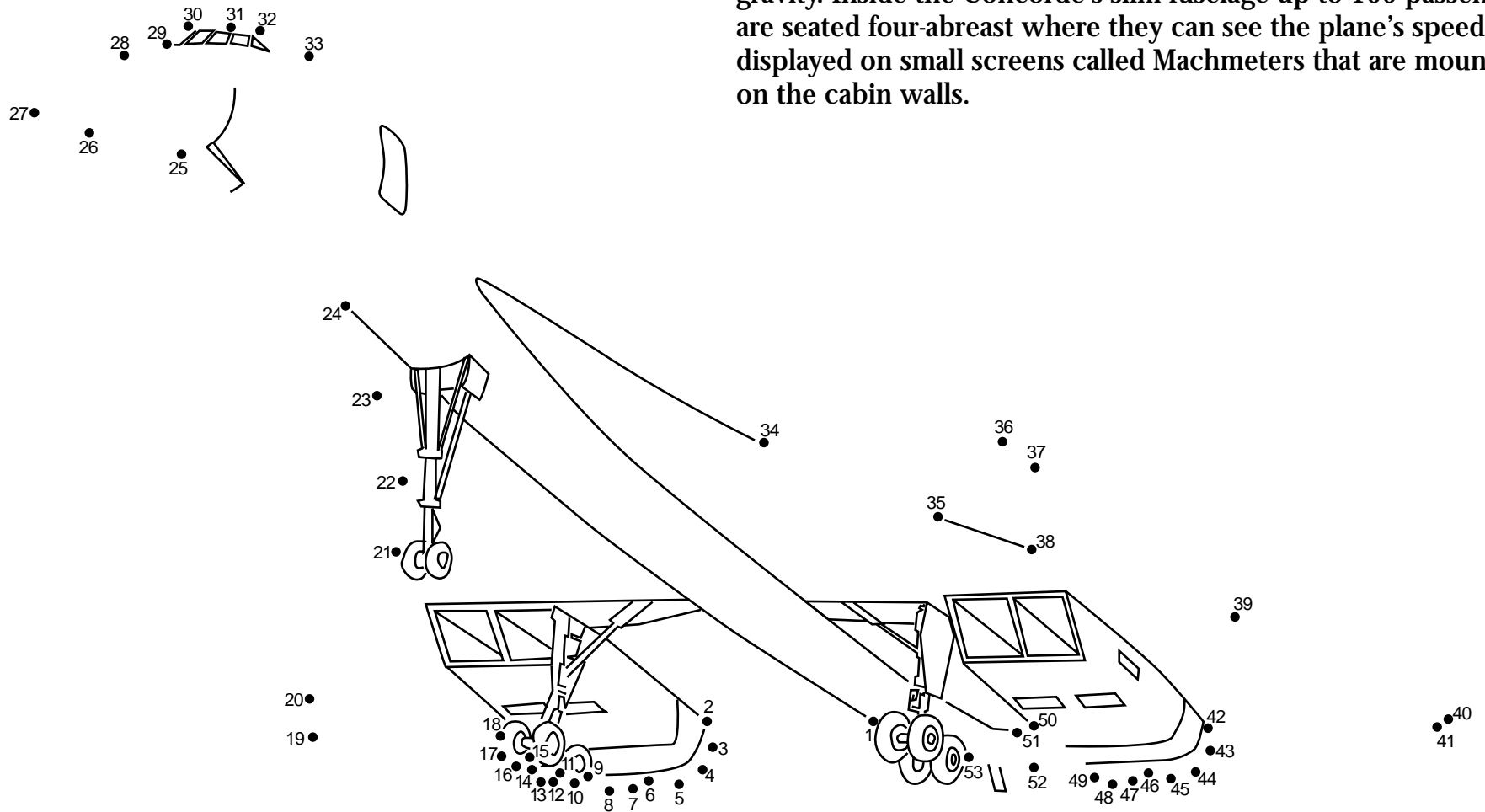
## McDonnell Douglas F-15 — Eagle

A versatile air-superiority fighter, the all-weather Eagle, introduced in 1970, also has a formidable ground attack capability. Powered by twin 23,180 pound-thrust Pratt & Whitney engines, the Eagle flies at a top speed of more than 1,650 miles per hour and carries eight Sidewinder and Sparrow missiles in addition to its 20-mm cannon. Pilots of an earlier day spoke of forcing their birds (planes) into a vertical climb; they were exaggerating. The F-86 Sabre could achieve perhaps a 45-degree angle; the F-4 Phantom about 70 degrees. The Eagle could stand on its tail and rocket straight up into the sky, accelerating to supersonic speed as it went. It could climb to 60,000 feet—more that 11 miles up—in two minutes.



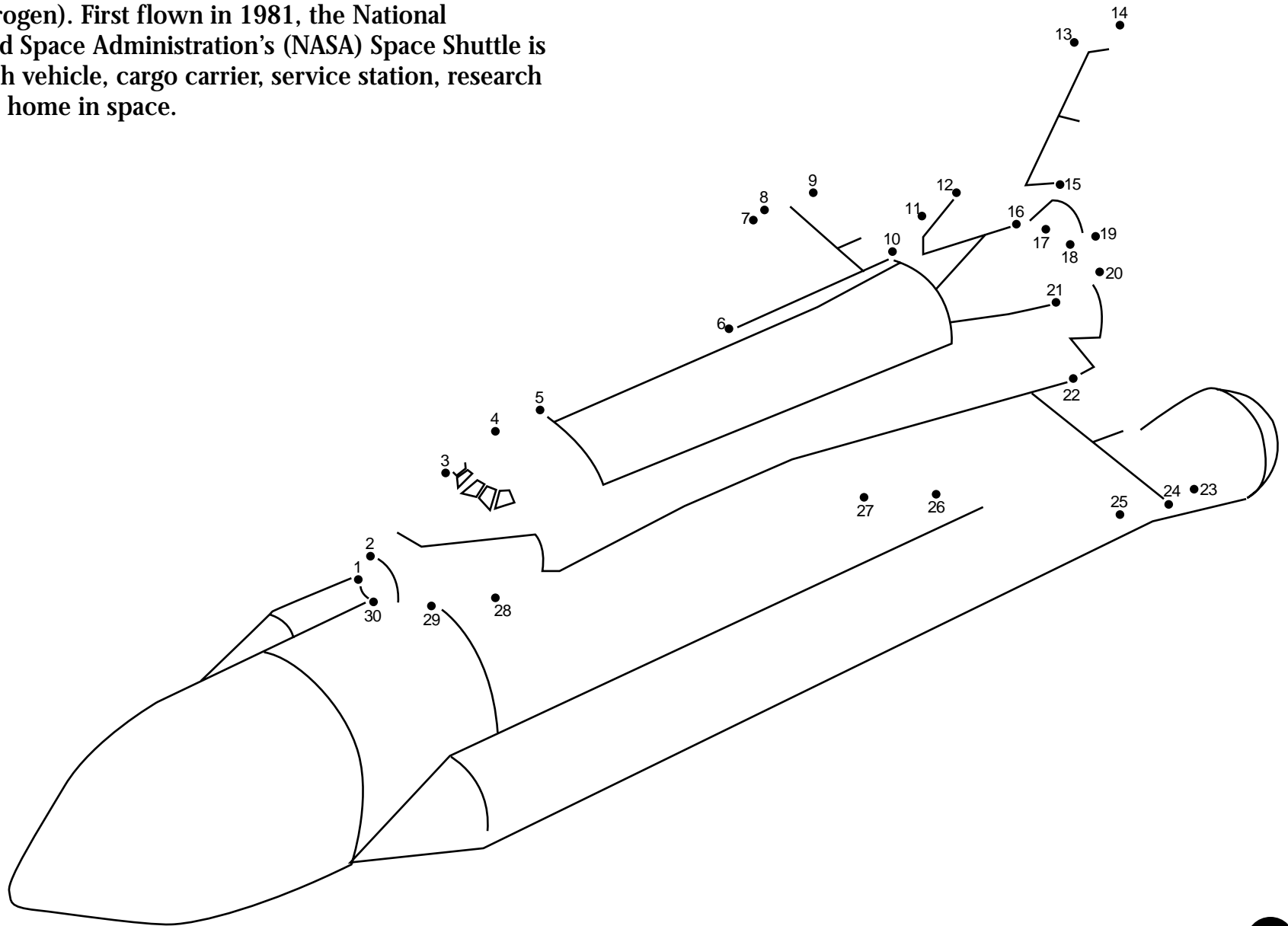
## Concorde

First put into service in 1976, the supersonic Anglo-French Concorde cruises at twice the speed of sound and has a range of 3,050 miles. A fantastic 34,000 gallons of fuel are stored in wing tanks. As fuel is consumed during flight, a system of pumps and valves shifts part of the fuel's weight to auxiliary tanks located fore and aft to compensate for changes in the plane's center of gravity. Inside the Concorde's slim fuselage up to 100 passengers are seated four-abreast where they can see the plane's speed displayed on small screens called Machmeters that are mounted on the cabin walls.



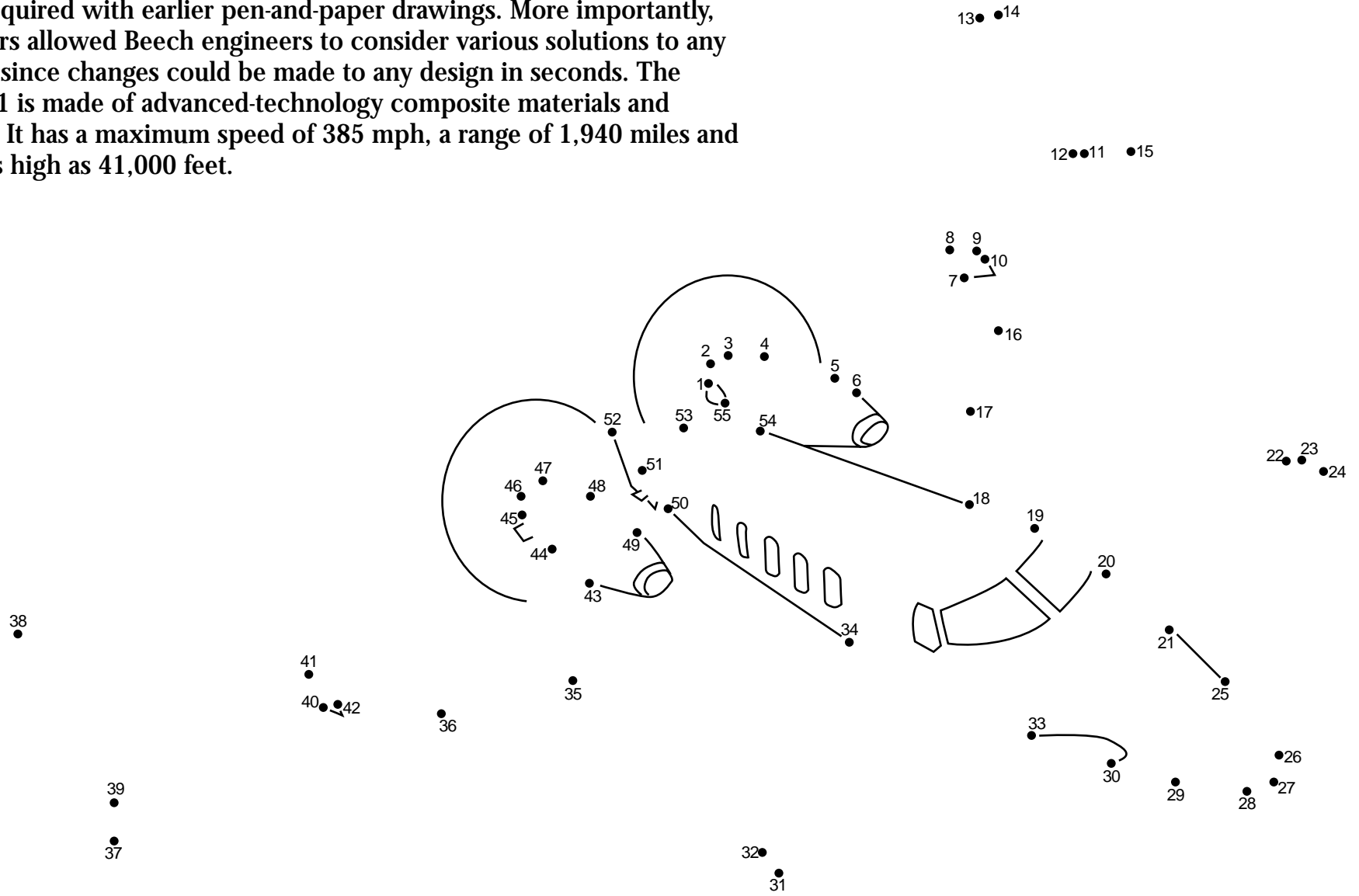
## Space Shuttle System

The Space Shuttle System consists of the winged orbiter spacecraft and three propulsion elements—two solid rocket boosters, three main engines and the external tank (a huge gas tank that holds a little over 1/2 million gallons of liquid oxygen and liquid hydrogen). First flown in 1981, the National Aeronautics and Space Administration's (NASA) Space Shuttle is used as a launch vehicle, cargo carrier, service station, research laboratory, and home in space.



## Starship

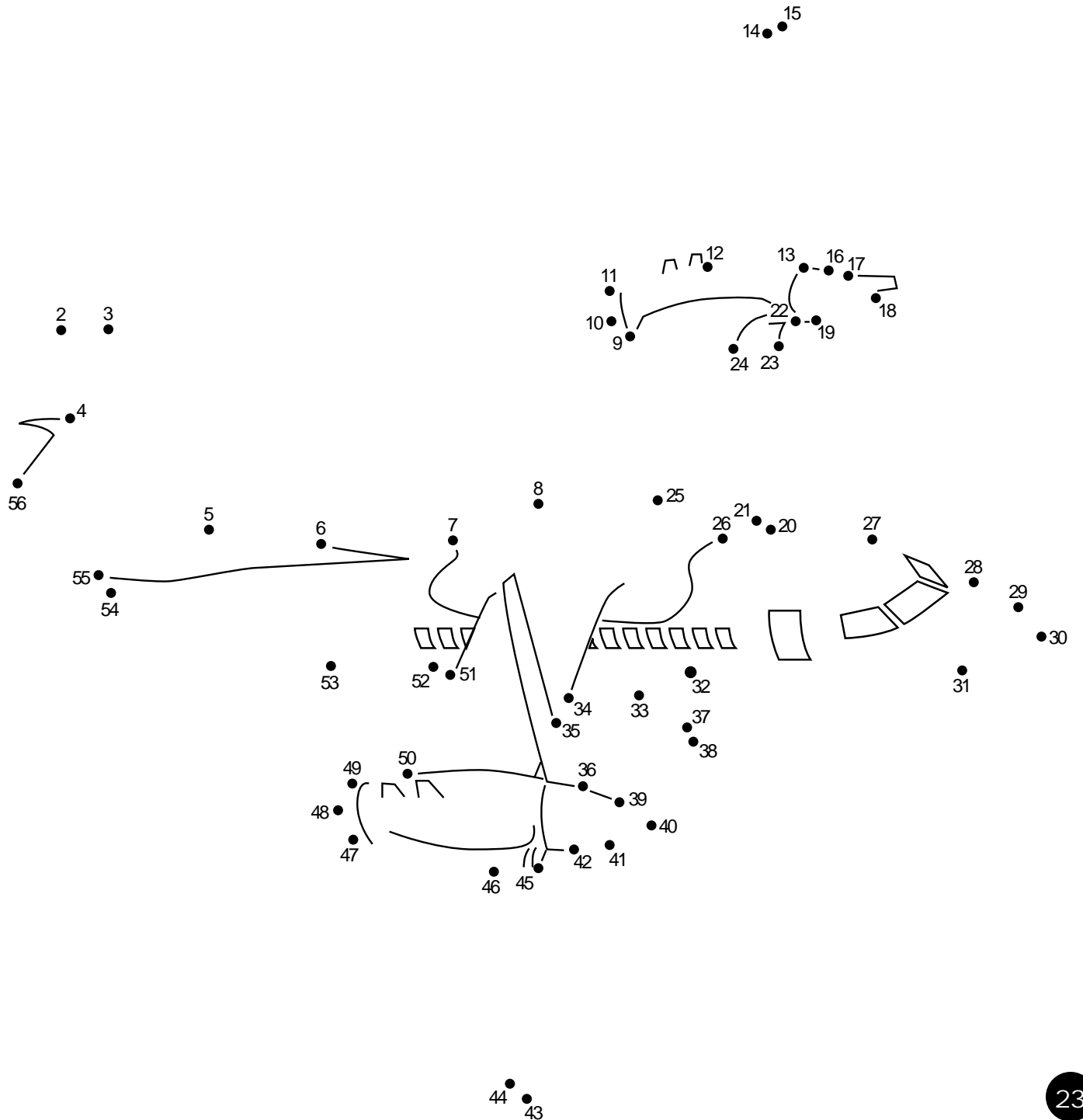
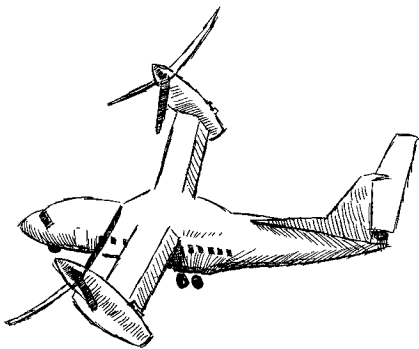
Starship 1 is the first business aircraft to be totally designed with the aid of computers. The process of checking fit between parts, contours, and the fit and function of moving parts was accomplished more quickly than was previously possible. Changes were made in seconds instead of days as was required with earlier pen-and-paper drawings. More importantly, computers allowed Beech engineers to consider various solutions to any problem since changes could be made to any design in seconds. The Starship 1 is made of advanced-technology composite materials and titanium. It has a maximum speed of 385 mph, a range of 1,940 miles and can fly as high as 41,000 feet.

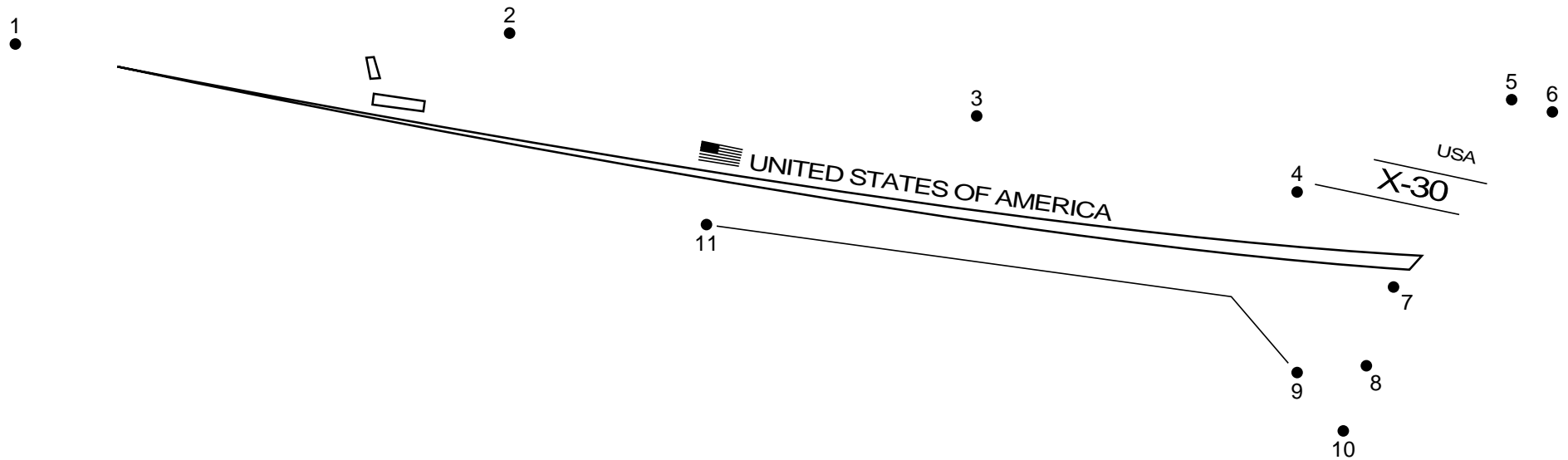


# NASA Tiltrotor Transport Aircraft

An artist's concept of a Tiltrotor Transport Aircraft, capable of helicopter-like takeoffs by tilting the rotors upward (see insert).

In level flight the Tiltrotor aircraft is expected to reach speeds of over 300 miles per hour.





### X-30 National Aero-Space Plane

This is an artist's concept of a sleek flight research vehicle called the X-30. It would be able to take off horizontally, accelerate into orbit around Earth (flying through the upper atmosphere eight times faster than existing air-breathing aircraft), then return through the atmosphere for a runway landing. The National Aeronautics and Space Administration (NASA), the Department of Defense and a national contractor team of the country's leading aerospace companies is aimed at testing just such a vehicle at the leading edge of technology. The X-30 will require an extensive program of aerodynamic and engineering investigations.